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CONFLICT AND RECREATION BEHAVIORS AMONG SNOWMOBILERS: THE ROLE
OF ORGANIZATIONAL MEMBERSHIP

By

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Thesis

presented in partial fulfillment of the requirements
for the degree of

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in Parks, Tourism and Recreation Management

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ABSTRACT

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Parks, Tourism and Recreation Management

Conflict and Recreation Behaviors Among Snowmobilers: The Role of Organizational Membership

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This study explores the relationship between conflict and recreation behaviors among snowmobilers at western Montana snowmobile access sites (WMSAS) and investigates whether organizational membership influences the types of conflict experienced and attitudes towards appropriate recreation behaviors. Data were collected through an intercept survey, and responses from 250 snowmobilers were analyzed. Descriptive statistics and chi-square tests were used to examine the research questions.

The findings suggest that snowmobilers at WMSAS experienced minimal conflict, with interpersonal conflict related to "hearing others" being the most observed. However, this conflict was not necessarily perceived as a problem by the majority of respondents. Snowmobilers demonstrated an aligned set of attitudes towards appropriate recreation behaviors, indicating the effectiveness of education and messaging regarding responsible snowmobiling practices.

Organizational membership did not significantly influence the types of conflict experienced by snowmobilers. Nonmembers tended to perceive more problems with behaviors, while members reported lower levels of conflict typologies. Skill level differences were also identified, highlighting the importance of considering this factor when understanding conflict among recreationists.

Managers should focus on indirect management strategies, such as promoting TreadLightly! guidelines and providing educational materials, to enhance snowmobilers' understanding of appropriate behaviors. Collaborating with snowmobile clubs and organizations can facilitate the dissemination of messaging and encourage responsible recreation practices. Future research should explore the impact of these strategies on actual behavior and consider a broader range of variables to gain a more comprehensive understanding of snowmobilers' experiences and attitudes.

In conclusion, this study sheds light on the conflict dynamics and attitudes of snowmobilers in the WMSAS. It provides valuable insights for managers to develop effective strategies for promoting responsible recreation and mitigating potential conflicts in snowmobiling areas.

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Chapter 1: Introduction

Snowmobiling has emerged as a popular winter recreational activity, attracting enthusiasts to numerous snowmobile areas worldwide. With the increasing number of snowmobilers, the need for effective management strategies to address potential conflicts and encourage responsible recreation behaviors has become paramount. Understanding the complexities of conflict dynamics and the factors influencing attitudes towards appropriate recreation behaviors among snowmobilers is essential for ensuring sustainable and enjoyable snowmobiling experiences.

This study centers on the western Montana snowmobile access sites (WMSAS), a prominent destination for snowmobilers, to delve into the relationship between conflict typologies and organizational membership among snowmobilers. Over the past few decades, research on recreation conflict has gained significant attention in outdoor recreation literature, with efforts focused on developing theoretical and conceptual approaches to address conflicts in Parks and Protected Areas (PPAs) (Lucas, 1964). Although studies on interpersonal conflict between recreation groups have provided valuable insights (Knopp & Tyger, 1973; Jacob & Schreyer, 1980; Miller et al., 2017), research on intra-activity winter recreation conflict remains relatively limited, leading to gaps in understanding participation motives, outcomes, benefits, and constraints (Gatti et al., 2022).

This study aims to explore three main objectives: firstly, to investigate the types of conflict experienced by snowmobilers at WMSAS; secondly, to assess whether organizational membership influences the type of conflict a snowmobiler experiences; and thirdly, to evaluate whether organizational membership influences attitudes towards appropriate recreation

behaviors. By addressing these research questions, our goal is to offer valuable insights to managers, snowmobile organizations, and policymakers, ultimately enhancing the snowmobiling experience, promoting responsible behavior, and minimizing potential conflicts within snowmobile areas.

In this paper, we present the methodologies employed for data collection and analysis, along with the comprehensive results of our study. Additionally, we discuss the implications of our findings and provide recommendations for managers and policymakers to create an environment that fosters positive and harmonious recreational experiences for all snowmobilers, ensuring the long-term sustainability of these recreational areas.

Overall, this study contributes to the broader understanding of conflict dynamics and recreation behaviors among snowmobilers. By examining the influence of organizational membership and identifying key factors related to conflict experiences, our research endeavors to support evidence-based management practices, fostering a cohesive and enjoyable snowmobiling community for all participants.

1.1 Outdoor Winter Recreation Management

In recent times, the demand for winter recreational activities has been on the rise (Eisen, 2015). This has posed challenges for recreation managers and planners, who now face the task of addressing emerging conflicts and ensuring the preservation of desired conditions in these areas. Winter landscapes offer a diverse array of recreation activities, such as snowmobiling, cross-country skiing, snowshoeing, winter hiking, and winter biking, all of which rely on the presence of snow or ice. The specific mode of engagement, whether it involves skis, shoes, tires, rods,

rope, or sled, is a defining characteristic for each activity (McLaughlin & Paradise, 1980), and each activity is closely associated with certain types of settings and desired experiences.

Most outdoor winter recreation activities typically occur in dispersed settings with a low density of users and without facilities or development. These activities are limited to areas where snow, ice, and cold temperatures prevail. As new forms of recreation, such as fat bikes and snow-bikes, enter the scene and technology continues to transform the recreation experience, it becomes essential for research and management efforts to address these emerging conflicts (Monz & Kulmatiski, 2016; Neumann & Mason, 2019).

To tackle the challenges posed by winter recreation conflicts, PPA (Parks and protected Areas) managers have implemented the United States Forest Service (USFS) 2015 Over-Snow Vehicle (OSV) Rule. This rule mandates that all US National Forests establish a travel management plan for motorized vehicles used on snow (e.g., tracks, skis, blades) with the aim of preserving resources and offering opportunities for both motorized and non-motorized winter recreation use (USFS, 2015). By doing so, the rule recognizes the importance of balancing the needs of different recreational groups and maintaining the desired experiences for everyone involved.

Consequently, research becomes a valuable tool in understanding the evolving characteristics of the winter recreation experience, particularly by analyzing how recreationists interact with each other and the landscape. Prior to implementing management plans, it is crucial for managers and researchers to explore the nature of conflicts occurring among and within winter recreationist groups. This knowledge will aid in developing effective strategies to address the challenges and ensure sustainable and enjoyable winter recreation for all.

1.2 Recreational Snowmobiling

Snowmobiling holds significant importance in U.S. national forest management plans due to its consistent status as one of the primary winter recreation activities in USFS areas (USFS, 2015). According to the USFS 2021 National Visitor Use Monitoring Program, approximately 1.6% of the 156 million visitors to U.S. National Forests in 2021 engaged in snowmobiling, resulting in an estimated 2.4 million visitors annually. Snowmobilers constitute a diverse group, with motivations such as spending time with family and friends, seeking adventure and challenge, pursuing unique experiences, socializing with others, aiming for specific destinations, and seeking prestige, as identified among snowmobilers in Alberta, Canada (Jackson & Wong, 1982).

In the United States, snowmobiling organizations play a vital role in the recreational community. With over 25 organized state associations and numerous local clubs, these organizations actively support recreation management through tasks such as trail construction, maintenance, design, and monitoring, as well as providing funding for such initiatives. Moreover, they contribute to the recreation community by organizing social events like races and fundraisers. Additionally, these organizations offer essential information on safety, operation, and responsible recreation, promoting a well-informed and enjoyable snowmobiling experience (ISMA, 2022).

1.3 Recreation Snowmobiling in Montana

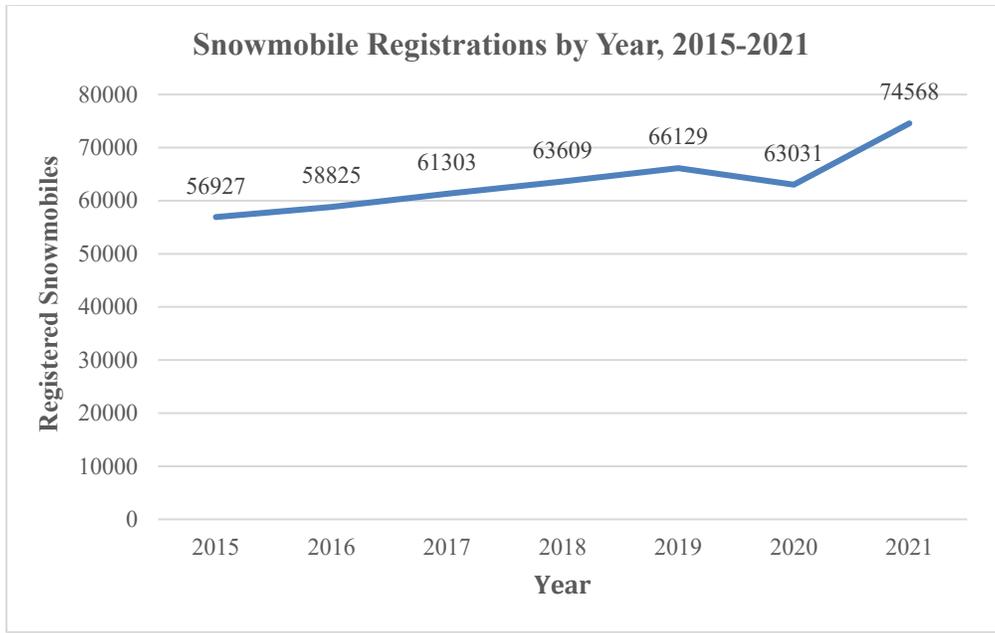
For many individuals in Montana, snowmobiling serves as both a means of transportation and a recreational activity. The Montana snowmobiling community has a strong foundation and is supported by the umbrella organization known as the Montana Snowmobile Association

(MSA), which plays a crucial role for numerous snowmobilers and winter recreation enthusiasts. The mission statement of the MSA emphasizes its commitment to educate the public about snowmobiling, enhance the riding experience in the region, promote safety, and provide opportunities for recreation ("MSA Mission Statement," 2023, pp. 1). Being part of the MSA and local clubs offers a sense of belonging, safety, involvement in decision making, and a social outlet.

In 2014, Sylvester (2014) reported that there were approximately 100,000 recreational snowmobilers in the state of Montana, and one in every eight households included someone who engaged in snowmobiling. As of 2021, there were 74,568 registered snowmobiles in the state, with an extensive network of over 4,000 miles of well-maintained trails (Montana Department of Justice, 2021; Montana Fish, Wildlife and Parks, 2019). Moreover, the 26 local snowmobile clubs affiliated with the MSA play a vital role in managing trail infrastructure, maintenance, grooming, and other responsibilities for these designated snowmobile routes (Montana Fish, Wildlife and Parks, 2015).

Figure 1

Montana Snowmobile Registrations by Year, 2015-2021



Note. Information from Montana Department of Justice, CY 21 Vehicle Registrations by County, 2015- 2021, <https://dojmt.gov/driving/mvd-by-the-numbers/>

More specifically, western Montana (MSA Districts 1-4, 5, and 8) is a highly popular area for snowmobiling in Montana. The western Montana counties where these clubs are located account for 51% of Montana's total current snowmobile registrations (Montana Department of Justice, 2021). Furthermore, 17 out of the 26 MSA clubs are situated in these districts (Appendix A), offering hundreds of miles of designated snowmobile trails and identified hot spots for snowmobiling recreation (FWP MT Snowmobile Recreation Planner). Notably, the 16 counties designated as western Montana (Table 1) reported 2,406 new snowmobile registrations in the year 2021 (Montana Department of Justice, 2021).

Table 1
New Snowmobile Registrations in western Montana Counties, MSA Districts, 1,2,3,4,5, and 8 (2021)

County	New Snowmobile Registrations (2021)
--------	-------------------------------------

Beaverhead	99
Broadwater	37
Deer Lodge	67
Flathead	543
Granite	71
Jefferson	80
Lake	105
Lewis & Clark	196
Lincoln	155
Madison	110
Mineral	47
Missoula	450
Powell	37
Ravalli	195
Sanders	62
Silver Bow	152
Total	2406

As the popularity of snowmobiling continues to rise within Parks and Protected Areas (PPAs), it is of utmost importance to develop effective management plans that address potential conflicts among various recreationists. Among the earliest types of recreation conflict studied in-depth was the conflict between snowmobilers and skiers (Jackson & Wong, 1982; Knopp & Tyger, 1973). Prior research on recreation conflict involving snowmobilers and other users has offered valuable insights into interpersonal conflicts between different winter recreation modes, such as motorized and non-motorized winter users (Jackson et al., 2003), as well as conflicts between snowmobilers and back-country skiers (Miller & Vaske, 2016; Vaske et al., 2019). Given the increasing popularity of snowmobiling, it becomes crucial to thoroughly investigate its effects within the recreational environment to ensure a positive and enjoyable experience for all participants. Understanding the types of conflict experienced by snowmobilers and their perspectives on appropriate recreation behaviors is essential for effective management and conflict resolution strategies.

1.4 Recreation Conflict Research

Since the 1980s, a prevailing approach in research has been to employ Jacob and Schreyer's (1980) conceptual framework to address recreation conflict (Jackson et al., 2003; Ruddell & Gramann, 1994; Vaske et al., 1995). According to Jacob and Schreyer (1980), conflict arises from goal interference, commonly known as interpersonal conflict, which occurs when one individual attributes their conflict to another person's observed behavior. Subsequent studies have indicated that conflict can also arise in the absence of direct contact, termed social values conflict, which is characterized by perceived differences in norms or values related to a recreational activity (Ruddell & Gramann, 1994). For instance, a hiker may not experience interpersonal conflict when encountering a biker who does not yield on a trail, but they might still perceive conflict due to a belief that bikers generally do not yield to hikers.

In the field of recreation, research on social values conflict has been extensively applied to address these issues (Vaske et al., 1995; Carothers et al., 2001; Albritton et al., 2009; MacLennan & Moore, 2011). These studies utilize a methodological categorization process to classify respondents into conflict typologies (i.e., no conflict, interpersonal conflict, social values conflict) based on assessments of perceived behavior in various situations that recreationists may encounter. However, the measurements and operations of recreation conflict research have evolved over time, necessitating adjustments to measurements and the classification of conflict typologies (Tynon & Gomez, 2012; Vaske et al., 2007; Gibson and Fix, 2014).

1.5 Adapting the Recreation Conflict Model

In their study of motorized and non-motorized users, Gibson and Fix (2014) proposed an additional conflict typology called "latent-behavior conflict" to supplement the conflict typology

framework previously developed by Vaske et al. (2007) (see Figure 1). The latent-behavior conflict typology aims to capture situations where conflict arises when a recreationist does not fundamentally oppose a certain activity due to differing values or norms. However, the respondent still perceives specific unobserved behaviors related to that activity as problematic. To clarify, Gibson and Fix (2014) defined latent-behavior conflict as occurring when a person does not consider the overall activity of another recreationist as conflicting, but they do find certain behaviors they have not directly encountered to be problematic. For example, a motorized recreationist may not be bothered by other motorized recreationists in the area due to shared values/norms but still perceives other motorized recreationists riding too fast to be a “problem”, even if they did not observe someone riding too fast.

By introducing the latent-behavior conflict typology, Gibson and Fix (2014) addressed methodological and procedural challenges that were not previously accounted for in the Vaske et al. (2007) framework. For example, Gibson and Fix (2014) discovered that latent-behavior conflict existed among non-motorized recreationists who were initially categorized as experiencing either no conflict or social values conflict because they did not have a general "problem" with other recreationists' behaviors. Nevertheless, these respondents expressed feeling bothered by certain behaviors of other user groups in the area, leading to latent-behavior conflict.

Gibson and Fix (2014) recommended applying this framework to groups where social values conflict is expected to be minimal, such as recreationists participating in the same activity. This could be valuable in identifying a distinct type of salient conflict that hadn't been previously recognized. Nonetheless, they acknowledged the need for further testing and analysis of the results, which is the aim of the present thesis research. By exploring the existence of latent-behavior conflict among snowmobilers, this research could shed light on the different types of

conflict experienced by snowmobilers, providing valuable insights for recreation management and planning.

Figure 2

Adapted Conflict Evaluation Table (Gibson and Fix, 2014).

		Perceived Problem with Behavior	
		No	Yes
Observed	No	No Conflict	Latent-Behavior Conflict (not bothered) ¹
	Yes <td>Social Values Conflict (bothered)²</td> <td>Social Values Conflict (bothered)²</td>	Social Values Conflict (bothered) ²	Social Values Conflict (bothered) ²
Not Observed	No	No Conflict	Interpersonal & Social Values Conflict (bothered) ³
	Yes	No Conflict	Interpersonal conflict (not bothered) ⁴

Note. Figure based on typology presented by Gibson and Fix (2014) and Vaske et al. (2007).

¹Respondents did not observe a given situation, perceived it to be a problem, and disagreed with the statement “Other snowmobilers in the area bothers me.”

²Respondents did not observe a given situation, perceived it to be a problem or not a problem, and agreed with the statement “Other snowmobilers in the area bothers me.”

³Respondents observed a given situation, perceived it to be a problem, and agreed with the statement “Other snowmobilers in the area bothers me.”

⁴Respondents observed a given situation, perceived it to be a problem, and disagreed with the statement “Other snowmobilers in the area bothers me.”

With an increasing number of participants in snowmobiling within Parks and Protected Areas (PPAs), it is crucial to develop effective management plans to address potential conflicts between different recreationists. Among the first types of recreation conflict studied extensively was the conflict between snowmobilers and skiers (Jackson & Wong, 1982; Knopp & Tyger, 1973). Previous research on recreation conflict involving snowmobilers and other users has

provided insights into interpersonal conflicts between different winter recreation modes, such as motorized and non-motorized winter users (Jackson et al., 2003), as well as conflicts between snowmobilers and back-country skiers (Miller & Vaske, 2016; Vaske et al., 2019). These studies have highlighted conflicts related to access issues, environmental impacts, safety concerns, and specific recreation behaviors like rudeness, failure to yield, and passing too closely.

However, little is known about the types of conflict that snowmobilers experience within their own group. Although research has examined conflicts within recreationist groups (intra-activity conflict; Albritton et al., 2009; Carothers et al., 2001; Vaske et al., 2004), no studies have applied Gibson and Fix's (2014) conflict typology framework specifically to a group of snowmobilers. Therefore, this study aims to expand on previous recreation conflict research by utilizing Gibson and Fix's (2014) framework to gain further insights into the types of conflict occurring within a group of snowmobilers and how these conflicts may vary among them.

The research is conducted through the recreation conflict framework developed by Vaske et al. (2007) and further adapted by Gibson and Fix (2014). The study's primary objectives are to explore the types of conflict experienced by snowmobilers (R1) and to investigate whether they experience different types of conflict based on their affiliation with a snowmobile organization (R2). The conflict typology includes categories such as no conflict, interpersonal conflict, social values conflict, interpersonal and social values conflict, and latent-behavior conflict (Figure 2).

To assess whether specific responsible recreation behaviors (perceived appropriateness) vary among snowmobilers based on their affiliation (i.e., member, non-member) to a snowmobile organization (R3), the study will utilize scales and measurements adapted from Backman et al.'s (2018) study of responsible recreation guidelines (i.e., Leave No Trace).

Responsible recreation behavior measures will be adapted using the TreadLightly! principles promoted by the American Council of Snowmobile Associations (ACSA).

By exploring differing perceptions of behaviors and analyzing how snowmobilers differ in the types of conflict they experience, this research aims to help managers better understand the nature of the conflict and address specific behaviors to resolve conflicts and enhance the overall quality of the recreation experience. The study seeks to answer the research questions based on the hypothesized model of recreation conflict (Figure 2) and will analyze the perceptions of appropriate recreation behaviors among snowmobilers at western Montana snowmobile access sites (WMSAS).

1.6 Research Questions

- 1) What are the types of conflict that snowmobilers experience?
- 2) How do members and nonmembers of snowmobile organizations differ in the types of conflict they experience?
- 3) How do members and nonmembers of snowmobile organizations differ in their perceptions of appropriate recreation behaviors?

Chapter 2: Literature Review

2.1 Interpersonal Conflict

Since the 1980s, the framework for researching recreation conflict has predominantly applied Jacob and Schreyer's (1980) conceptualization to address conflicts occurring in PPAs. According to Jacob and Schreyer (1980), recreation conflict arises from goal interference, known as interpersonal conflict, which occurs when one individual attributes their conflict to the behavior of another person. For conflict to occur, the individual must perceive either a direct or indirect impact on their satisfaction derived from participating in their recreation experience. If their satisfaction is obstructed due to the presence (direct) or perceived presence (indirect) of another recreationist, conflict will arise (Jacob & Schreyer, 1980).

Jacob and Schreyer (1980) identified four main factors contributing to recreation conflict:

- 1) activity style, referring to the personal meanings different individuals attach to a specific activity;
- 2) resource specificity, which reflects the importance people place on a particular setting for engaging in their chosen recreation activity;
- 3) mode of experience, addressing how individuals experience the environment while participating in a recreational activity; and
- 4) lifestyle tolerance, concerning the ability of individuals to accept others who might not share the same goals and values.

Conflict can result from one or a combination of these factors when the goals of the recreation experience are hindered by the physical presence or behavior of an individual or group of recreationists. Over the past 50 years, many studies have employed Jacob and Schreyer's (1980) model to further conceptualize and measure recreation conflict, often referred to as interpersonal conflict (Vaske et al., 1995).

Numerous research studies have explored the relationships and interpersonal conflicts among various recreationist groups, such as hunters and non-hunters, cross-country skiers and snowmobilers, snowboarders and skiers, bikers and hikers, backcountry skiers and helicopter backcountry skiers, and motorized and non-motorized river recreationists. For instance, a cross-country skier might experience mode of experience goal interference when encountering a snowmobiler on the same trail or seeing snowmobiler tracks. This perceived interference can lead to conflict (Knopp & Tyger, 1973).

Furthermore, a study on interpersonal conflict found that ecological risks and environmental stress can increase out-group aggression and group-defense, intensifying conflict between different groups in resource management. This study highlights the concept of intergroup conflict relating to in-group identification, which will be useful in understanding conflict among a group of recreationists.

Although existing research has provided valuable insights into the conceptualization of recreation conflict, literature suggests that additional improvements to measures and conceptualizations are necessary to fully explore the social dimensions of recreation conflict. For example, conflicts may still arise even when physical contact between recreationists is not possible or prevented by geographical barriers. Research has suggested the incorporation of social values conflict in addition to interpersonal conflict valuations to measure conflicts occurring beyond the physical recreation setting, leading to a more comprehensive understanding of recreation conflict (Vaske et al., 2007) through exploratory research.

2.2 Social Values Conflict

In attempt to further address emerging and ongoing recreation conflict, the use of social values conflict has been identified as a means to address the social relationships leading to recreation conflict when recreationists do not come into physical contact (Ruddell & Gramann, 1994). According to Ruddell and Gramann (1994), social values conflict occurs when two groups do not share similar norms or values about an activity. Distinct from interpersonal conflict, social values conflict does not require the presence (i.e., direct or indirect) of others to occur (Vaske et al., 1995). This research suggests that social values conflict is determined by the perception that other recreationists are not behaving in a way that is satisfactory or aligned with the individuals perceived set of appropriate behaviors (i.e., values and norms). For example, Vaske et al. (1995) found non-hunters perceived conflict by just knowing that hunting took place in the area, suggesting conflict was due to hunters not having a set of values and norms that aligned with non-hunters, thus a social values conflict was observed.

Further, research has found that interpersonal conflict and social values conflict can also occur simultaneously (Carothers et al., 2001; Gibson & Fix, 2014; Tynon & Gomez, 2012; Vaske et al., 2007). Research conducted by Vaske et al. (2007) measured conflict between cross-country skiers and snowmobilers and found that both groups experienced conflict due to perceived and observed problem behaviors, suggesting the groups experienced interpersonal conflict from observed problem behaviors and social values conflict from perceived problem behaviors. In addition, research conducted between different activity groups holding similar perceived values and norms further distinguished interpersonal and social values conflict (Carothers et al., 2001). Carothers et al. (2001) found that groups with similar valuations such as bikers and hikers not only experienced intergroup conflict, in addition hikers evaluating the

behaviors of other hikers also experienced social values conflict among each other, even though the groups were perceived to have a similar set of values and norms. Research on recreation conflict has established the existence of conflict between different activity groups and can also emerge when groups hold a different set of values and norms. Furthermore, the literature suggests that interpersonal and social values conflict can be asymmetrical, in which one group may perceive greater or less conflict than the other (Vaske et al., 2000). For example, Vaske et al. (2000) found that skiers perceived greater conflict with snowboarders than snowboarders did with skiers. As the research suggests, measuring and evaluating recreation conflict requires a clear distinction between interpersonal and social values conflict to effectively address the types of recreation conflict a recreationist is experiencing.

In an effort to further conceptualize social values conflict, research has focused on measuring social values conflict based on the acceptable or unacceptable behavior of other recreationists (Carothers et al., 2001; Miller & Vaske, 2016). Results from these studies suggest that measuring the acceptability of behavior can determine the existence or non-existence of social values conflict among recreationists. However, research conducted by Tyson and Gomez (2012) reported that an activity group may be a better determinate than behavior valuations when measuring interpersonal and social values conflict. In their study recreation conflicts were more likely to align based on the activity group and not based on the type of behavior (i.e., being too close). This suggests that behaviors may not sufficiently measure social values conflict, due to additional latent factors affecting social values conflict among different activity groups, further suggesting that activity groups may be useful in framing and distinguishing types of recreation conflict.

2.3 Latent-behavior Conflict

Gibson and Fix (2014) made an important discovery that individuals can experience social values conflict, referred to as latent-behavior conflict, even when they do not personally have a problem with a particular behavior, regardless of contact with other recreationists. This finding highlights the need for a more comprehensive conceptualization of social values conflict, which requires the use of a latent-behavior typology to assess the extent of conflict when a recreationist perceives certain behaviors as problematic, yet is not bothered by other recreationists in the vicinity. This additional conflict category, latent-behavior conflict, was proposed by Gibson and Fix (2014) to be incorporated into the existing recreation conflict framework developed by Vaske et al. (2007).

The latent-behavior conflict category serves to distinguish cases where perceived problem behaviors exist, but there is no underlying social values conflict (i.e., differing values/norms). To clarify this distinction, Gibson and Fix (2014) explained that a person may not generally oppose an activity (i.e., no social values conflict) but still views specific behaviors, which they have not personally encountered, as problematic. For instance, a snowmobiler may not be bothered by other snowmobilers in the area due to shared values/norms but still perceives off-trail riding as a "problem" even if they haven't observed it. Latent-behavior conflict offers a way to understand conflict types among groups that may share similar values and norms (i.e., no social values conflict) but still have concerns about specific behaviors.

To validate their proposed changes to Vaske et al.'s (2007) model, Gibson and Fix (2014) conducted a study on motorized and non-motorized river recreationists, and the results supported the classification of latent-behavior conflict. This suggests that latent-behavior conflict can provide valuable insights into situations where recreationists have issues with specific behaviors

but do not hold social opposition to another group due to differing norms or values. However, since then, no further applications or testing of Gibson and Fix's (2014) framework have been documented in the literature, and the framework has not been used to address conflicts among recreationists participating in the same activity.

2.4 Intragroup Conflict

The goal interference model proposed by Jacob and Schreyer (1980) offers valuable insights into the conceptualization of intragroup conflict and its influence on recreation conflict. According to Jacob and Schreyer (1980), intragroup conflict arises when individuals participating in the same activity, but with varying levels of status (e.g., equipment, expertise), are exposed to problematic behaviors. This suggests that intragroup conflict is primarily interpersonal in nature (Mueller & Graefe, 2018). For example, skiers of different skill levels may perceive the behaviors of less-skilled skiers as conflicting with their own recreation experience (Vaske et al., 2004). In line with interpersonal conflict, intragroup conflict has been predominantly addressed in the literature through the lens of activity style goal interference (Albritton et al., 2009; Carothers et al., 2001; MacLennan & Moore, 2011; Thapa & Graefe, 2003; Vaske et al., 2004). It is also possible for a recreationist to experience both interpersonal and intragroup conflict simultaneously. For instance, a skier witnessing another skier skiing recklessly may experience conflict with that individual.

MacLennan and Moore (2011) conducted research applying the social values conflict framework (Vaske et al., 2007) to explore conflicts among recreationists engaged in the same activity and found that hikers on the Appalachian Trail experience both interpersonal conflict and significant social values conflict. This study supports the notion that evaluating both

interpersonal and social values conflict is necessary to understand conflicts among recreationists participating in the same activity, and that intragroup conflict can encompass both interpersonal and social values conflicts. Assessing the levels of intragroup conflict can provide further insights into the challenges faced in managing recreation conflict, particularly for groups engaged in the same activity where undesired behaviors are observed.

To shed light on how conflict may arise within a group of recreationists, a study by Lord and Elmendorf (2008) revealed that members of all-terrain vehicle (ATV) recreation organizations held significantly different needs and opinions compared to nonmember ATV users. For example, members placed greater importance on challenging trails, access, and longer trail systems. However, the type of conflict was not explicitly examined in this study. Another study by Mann and Leahy (2010) found that individual ATV riders held divergent norms compared to identified ATV club members, with the latter viewing individuals deviating from club norms as "bad apples" or those who counter the club's norms. Additionally, a case study by Vail and Heldt (2004) highlighted contentious issues among snowmobilers, such as hot spot congestion during peak times on prime trails and concerns about free riding (recreationists using trails without participating in their maintenance, monitoring, and funding). These examples suggest that intragroup conflict can occur among motorized user groups based on norm valuation and attitudes. However, exploring divergent behaviors could further enhance our understanding of conflicts arising within a group of recreationists.

Previous literature has employed in-group and out-group identification systems as a useful framework to address conflicts among similar recreationists, particularly when considering conflicting behaviors within the group (Vaske, Carothers, Donnelly, & Baird, 2000; Vaske, Dyar, & Timmons, 2004). In-group refers to recreationists participating in the same

activity. These studies indicate that conflict can be identified by examining the characteristics and behaviors of a group of similar recreationists. Further research has measured specific behaviors, such as skill level (e.g., inexperience), as reasons for conflict emerging within a group of skiers (Vaske et al., 2004), suggesting that similar behavioral conflicts could exist among snowmobilers with varying skill levels. Safety-related behaviors among snowmobilers, such as travel speed, alcohol use, inexperience, and poor judgment, can also contribute to conflict within a group of similar recreationists (Pierz, 2003). Considering the literature above, it becomes evident that a group of recreationists engaged in the same activity may differ in their norms, attitudes, and behaviors. Therefore, exploring the differences in conflict types and identifying divergent behaviors can provide a deeper understanding of how conflict types and perceptions of appropriate behaviors impact the recreation experience within a group of recreationists based on their membership (i.e., in-group) or nonmembership (i.e., out-group) in an organization.

2.5 Group Identification

The term "in-group" refers to an exclusive and typically small group of people who share a common interest or identity (Oxford English Dictionary). In the context of recreation, Vaske et al. (2000) define in-group as recreationists participating in the same activity (e.g., snowboarders). In this sense, in-group members can be understood as a group of recreationists (e.g., snowmobilers) engaging in the same activity, often with some form of exclusivity or limitations to others, such as membership requirements. Previous research has utilized social groups and organizational membership to define in-groups and explore how values and goals align within these groups (Bogardus, 2012). For example, Bogardus studied climbers and assessed the presence of intragroup conflict within this "social world," finding that discourse and

conflict arose among climbers due to differences in risk and adventure levels. Organizational membership and social groups have also been examined in research to understand how membership influences motivations for recreational behavior (e.g., conservation, environmental concerns) and impacts the overall recreation experience (Dennis & Zube, 1988; Havitz & Howard, 1995). Dennis and Zube (1988), for instance, investigated how voluntary association membership and participation in a specific recreational activity indicated similar valuations of conservation behavior, suggesting that when aligned, conservation values can support group endeavors. They further suggested that groups may provide additional benefits for improving the social recreation experience (e.g., knowledge, status, influence) when members align their conservation values with the group. These studies suggest that group membership creates a positive feedback loop between individuals and groups when values and norms are aligned. For example, if a group establishes a norm of staying on designated trails, members are expected to abide by that norm to fulfill their commitment to the group. Conversely, if a member fails to adhere to the group norm, conflict may arise because their behavior is no longer aligned with the established values and norms of the group.

Moreover, Heywood (1987) explored social groups to examine experience preferences of different types of river recreationists (i.e., intergroup) and found that recreation groups played a significant role in shaping expectations and preferences for the recreation experience. Heywood suggested that an individual's enhanced recreation experience could be achieved through a process of norm alignment within the group, resulting in the adoption of norms at a societal level as recreationists seek to improve their overall experience. This implies that identifying a set of aligned values and norms among different recreationists at the group level may help establish a common set of behaviors that can permeate throughout the entire spectrum of the recreation

experience. Mann and Leahy (2010) conducted a study that found individual ATV riders had differing norms compared to ATV club members. For example, ATV club members viewed individuals acting differently from the club's norms as "bad apples" or those who counter the norms upheld by club members. This suggests that ATV club members may identify certain behaviors as problematic differently from nonmembers. Therefore, managers and researchers should consider the potentially influential role that membership in recreation organizations may play in establishing values, norms, and addressing problem behaviors to effectively resolve recreation conflicts.

To provide further clarity on the conceptualization of in-group, previous literature in recreation conflict research has utilized this concept to categorize individuals who have conflicting sets of behaviors within their recreation experience while participating in the same activity (Albritton et al., 2009; MacLennan & Moore, 2011; Thapa & Graefe, 2003; Vaske et al., 2004; Vaske et al., 2000). For example, MacLennan and Moore (2011) found that long-distance hikers along the Appalachian Trail distinguished themselves based on differences in what the trail meant to them (e.g., hiking all or some of the trail, activity style), resulting in further subcategorization of hikers as "purists" and "non-purists." This indicates that simply categorizing individuals as in-group or out-group members may not fully capture the differentiation in behaviors that arise within groups. As suggested by Vaske et al. (2007), individuals participating in the same activity may not always be able to distinguish themselves as in-group or out-group members. For instance, the valuation of a recreation experience may differ among in-group members who participate in multiple or overlapping recreation activities, forming subgroups. Therefore, in-group members must be clearly defined to appropriately address differentiations in conflict within a group, as there can be cross-over valuations and confusion of in-group member

behaviors. To address this issue, research needs to provide a clear definition and characterization of those considered in-group members to avoid inconsistencies, recognizing that activity participation alone may not be sufficient to define in-group membership. Organizational membership can, therefore, offer a clearer delineation and description of in-group members when examining differentiating behaviors within a group of recreationists participating in the same activity.

2.6 Appropriate Recreation Behavior

To address the persistent conflict that zoning has been unable to resolve, researchers and managers have proposed indirect management strategies focused on education and messaging about appropriate recreation behavior (e.g., respecting other recreationists, wildlife) as a potential means of resolving conflicts (Backman et al., 2018; Mueller et al., 2018; Taff et al., 2014; Vaske, 1995). However, empirical research on the effectiveness of educational approaches in reducing discordant behavior within recreation groups has been limited. Investigating how these groups perceive conflict among individuals participating in the same activity could provide valuable insights into how education can effectively address behaviors that lead to conflict. For instance, Taff et al. (2018) measured levels of appropriate behaviors among day-users and backcountry-overnight visitors. Such research involves establishing behavior measurements (e.g., Leave No Trace principles) within a group of recreationists to explore their impact on recreation conflict and management, facilitating the targeted implementation of educational strategies to alleviate conflict when perceptions and attitudes differ.

Additionally, responsible recreation guidelines have been employed as messages to users on how to conduct themselves within a recreation setting (Mueller et al., 2018). Organizations

and agencies, such as the National Park Service (NPS), United States Forest Service (USFS), TreadLightly!, Leave No Trace (LNT), and Recreate Responsibly, provide sets of guidelines regarding responsible recreation. Specific guidelines for winter recreation and motorized activities are also offered by agencies and initiatives such as Recreate Responsibly, LNT, TreadLightly!, and Winter Wisely. These guidelines are used by PPA managers to promote a comprehensive set of expected behaviors for winter recreationists (i.e., injunctive norms). They can be communicated through various platforms, including online resources, physical signage, and in-person ranger talks, to educate recreationists and encourage responsible behaviors. While LNT guidelines have been commonly used and measured in recreation research, no studies have specifically applied the TreadLightly! principles as a measurement of responsible recreation behavior.

The TreadLightly! principles (T.R.E.A.D) encompass the following: travel responsibly, respect the rights of others, educate yourself, avoid sensitive areas, and do your part (Figure 3, Appendix B). These principles have been referenced in the literature as an example of guidelines consistent with Leave No Trace (LNT) principles (Mueller et al., 2018; Stott, 2019). Additionally, Mueller et al. (2018) suggested that using guidelines like TreadLightly! would be a more relevant approach for evaluating the recreation behavior of motorized users, particularly snowmobilers. The uniqueness of TreadLightly! lies in its specific focus on snowmobilers and motorized vehicles, promoted by the American Council of Snowmobile Associations (ACSA), a national organization dedicated to uniting the snowmobiling community and providing various resources.

Considering this context, adopting TreadLightly! guidelines for assessing responsible recreation behaviors among snowmobilers was deemed appropriate, building upon previous measures like Leave No Trace (LNT) (Backman et al., 2018; Mueller et al., 2018). By evaluating the level of perceived appropriateness of these behaviors, data analysis can explore how attitudes towards

these behaviors differ among different groups of recreationists. Identifying these differences could be instrumental in addressing behaviors that contribute to intragroup conflict.

From a management perspective, delivering consistent and clear messaging (i.e., education) has been a key strategy for resolving recreation conflict. However, the effectiveness of the message relies on addressing specific behaviors. Therefore, exploring differing attitudes towards behaviors within a group may guide managers in specifically targeting the behaviors of subgroups through tailored messaging channels within organizations.

Figure 3

TreadLightly! Principles



2.7 Recreation Management and Conflict

The implications of recreation conflict and efforts to resolve it can be observed through the adoption of the Recreation Opportunity Spectrum (ROS) framework utilized by the US Forest Service (USFS) (Clark & Stankey, 1979). By applying the ROS framework, the USFS categorized activities as primitive, semi-primitive (non-motorized), and semi-primitive (motorized), establishing designated recreation zones (mode of experience) in an attempt to reduce interpersonal conflict (USFS, 2015). Zoning has long been recognized as a management tool to physically separate groups and mitigate recreation conflict (Greist, 1975). It remains the

primary approach used by managers in addressing interpersonal conflicts and conflicts between different activity groups in shared settings (Gibson & Fix, 2014; Miller et al., 2017). However, zoning has not completely eliminated all forms of conflict among recreationists (Miller et al., 2017), indicating the need for different strategies and approaches to explore conflict among recreationists.

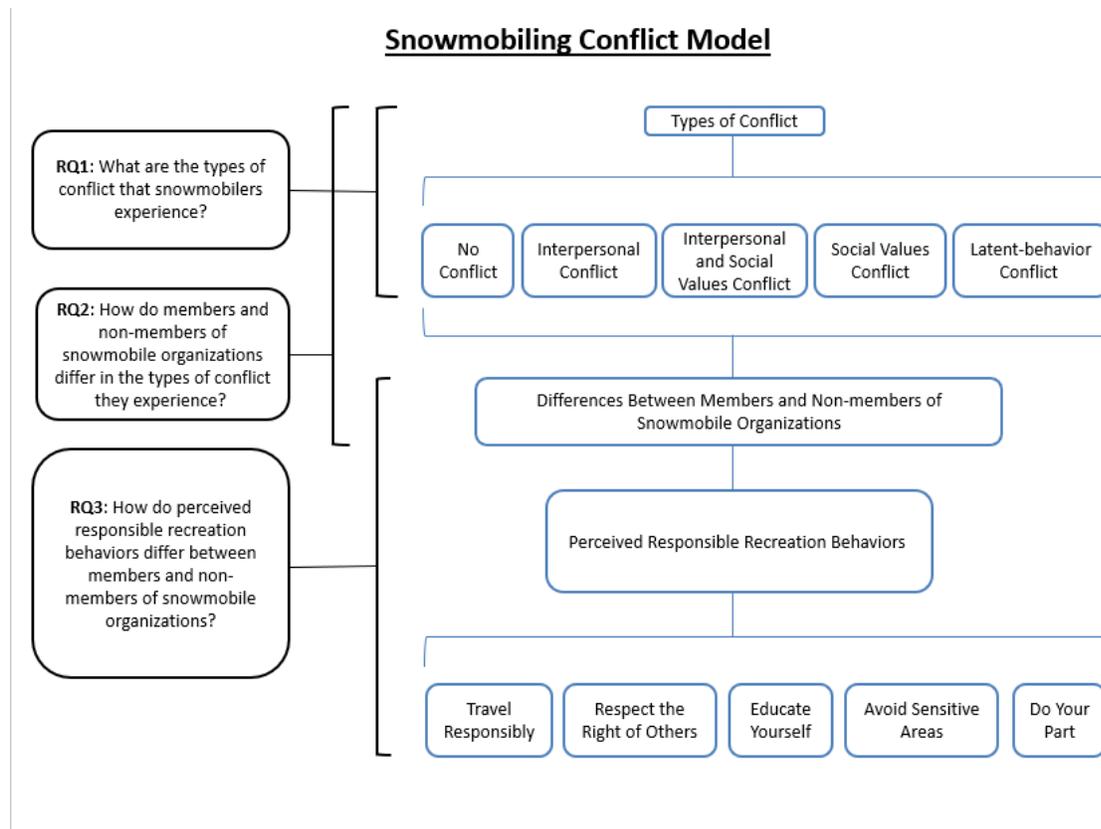
One recent managerial response to winter recreation conflict was the implementation of the 2015 United States Forest Service (USFS) Over-Snow Vehicle (OSV) Rule on National Forest lands. This rule aimed to involve public input, protect natural resources, and provide recreational opportunities (USFS, 2015). The OSV travel management rule requires all National Forest lands to develop winter recreation or travel management plans, designating and identifying areas for OSV use. This rule poses a challenge for managers and researchers to address problem behaviors and assess the effectiveness of these strategies in resolving recreation conflict.

The study discusses the framework for researching recreation conflict primarily based on Jacob and Schreyer's conceptualization from the 1980s. Conflict in recreational settings, known as interpersonal conflict, occurs when one person perceives interference with their satisfaction due to the presence or behavior of another recreationist. Jacob and Schreyer identified four main factors contributing to recreation conflict: activity style, resource specificity, mode of experience, and lifestyle tolerance. Numerous studies have explored conflicts among various recreationist groups, leading to interpersonal and social values conflicts (Carothers et al., 2001; Gibson & Fix, 2014; Tynon & Gomez, 2012; Vaske et al., 2007). Additionally, a new category called latent-behavior conflict has been proposed, addressing situations where perceived problem behaviors exist, but social values conflict is absent. Intragroup conflict also plays a role, arising

when individuals within the same activity group have differing behaviors and norms. Group identification and organizational membership influence conflict dynamics, with in-groups demonstrating differentiated behaviors. Indirect management strategies, such as education and messaging about appropriate recreation behavior, are proposed to address conflicts. The adoption of TreadLightly! guidelines and the use of Recreation Opportunity Spectrum (ROS) are mentioned as potential management tools. However, despite zoning and other management strategies, recreation conflict continues to be a challenge, necessitating further research and evaluation of management approaches.

Figure 4

Proposed modified model of conflict typology and variations in responsible recreation behaviors based on snowmobile organization membership



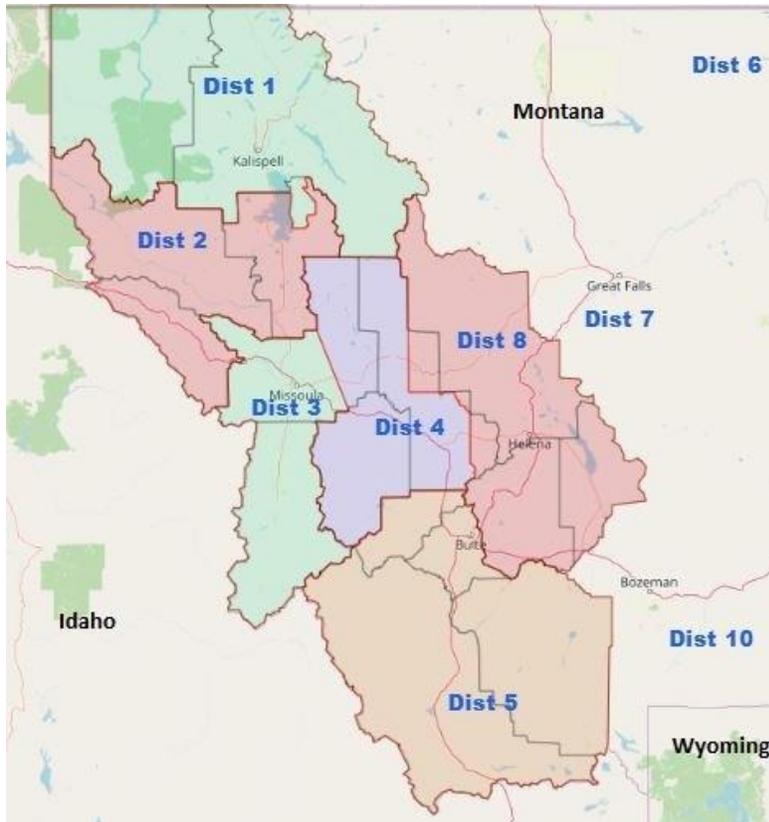
Chapter 3: Methods

3.1 Study Area

The research was conducted in the western region of Montana, specifically within the designated districts 1, 2, 3, 4, 5, and 8 of the Montana Snowmobile Association (MSA) (Figure 5). This area includes the headquarters of 17 snowmobile clubs recognized by MSA. The study area spans across 16 Montana counties, encompassing seven USFS designated Forests (Flathead, Kootenai, Lolo, Bitterroot, Lewis & Clark, Helena, and Beaverhead-Deerlodge), and three Montana DNRC Units (Northwest, Southwest, and Central). The sample population for the study consisted of individuals who engaged in snowmobiling within western Montana, either identified at specific sites or affiliated with snowmobile clubs/organizations within the scope of the study area, referred to as western Montana snowmobile access sites (WMSAS).

Figure 5

MSA District Boundaries in western Montana



Note. Information sourced from Montana Snowmobile Association; Association Districts, <https://www.snowmobilemt.org/about-us.html>

3.2 Research Design

To address the research questions, a multi-stage research design was implemented, utilizing a mixed-mode survey approach to gather data from snowmobilers within the designated study area. Survey research was chosen as the method to operationalize and answer the proposed research questions based on the conceptualization of the Snowmobile Conflict Model (Figure 3). By linking the theoretical framework of recreation conflict and the appropriateness of perceived recreation behaviors to empirical indicators (variables), comparisons between members and nonmembers of snowmobile organizations could be made.

Given the challenges of obtaining a reliable sample size due to the dispersed nature of snowmobiling, a mixed-mode surveying approach was devised, incorporating both intercept surveys and internet surveys (accessible via URL link or QR code). The survey was created using the Qualtrics Survey Platform software. The survey for all modes of distribution (intercept and internet) contained identical questions and response options, with the exception of one partially close-ended question used in on-site intercept surveys to indicate the survey location. The location options were presented as close-ended responses, and an open-ended option of 'other' was provided if the specific location was not listed. The purpose of duplicating the survey with consistent questions and responses across different modes was to minimize potential bias and errors (Dillman et al., 2014). The QR code and URL link were also tested to ensure consistency in survey layout, question order, and response options for accurate statistical comparisons (Dillman et al., 2014). Internet surveys were chosen for their fast and cost-effective data collection, offering design flexibility while adhering to appropriate surveying practices.

Intercept survey sites were identified in collaboration with land managers and snowmobile club members. These sites included parking areas and trailheads frequented by snowmobilers accessing snowmobile routes within the study area. The locations were cross-referenced as "snowmobile" access points using the Montana State Parks MT Snowmobile Recreation Planner map provided by Montana Fish, Wildlife and Parks. In collaboration with land managers and club representatives in western Montana, a comprehensive list of 10 "primary sites" (locations with the higher visitation) and 14 "alternate sites" (sites with lower visitation) was compiled for the purpose of conducting intercept surveys (Table 2).

Table 2

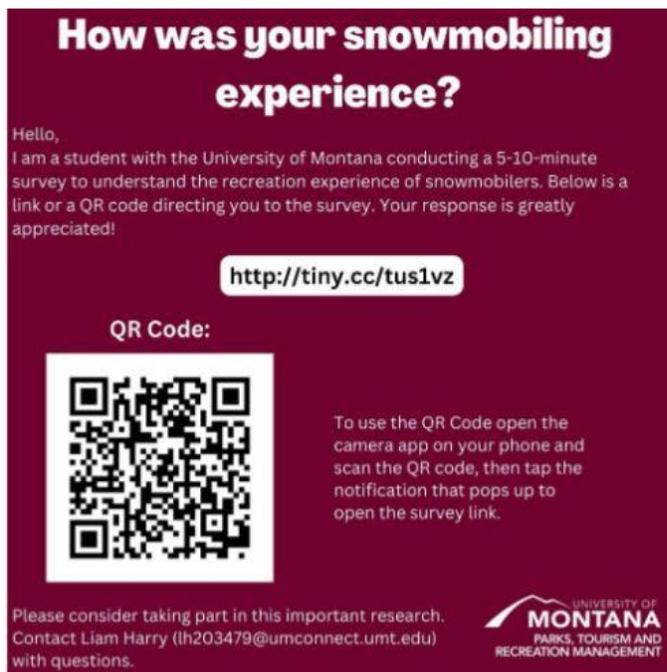
List of Intercept Survey Sites (Primary and Alternative) and Land Management Unit

Primary Sites	Unit
Lochsa Lodge	Nez Perce - Clearwater, Lochsa-Powell RD
Canyon Creek Parking Area	Flathead - Glacier View RD
West Side Parking Area	Lolo - Seeley Lake RD
Lost Trail Pass Snowpark Trailhead	Bitterroot - Sula RD
Elk Summit Parking Area, Rd. 111	Nez Perce - Clearwater, Lochsa-Powell RD
Taft Parking Area	Lolo - Superior RD
Olney Parking Area	DNRC- Stillwater
Garnet Range Rd. Parking Area	DNRC - Clearwater
Skalkaho Snowpark	Bitterroot - Darby RD
Lost Horse Parking Area	Bitterroot - Darby RD
Alternative Sites	Unit
Seeley Creek Parking Area	Lolo - Seeley Lake RD
Porcupine Parking Area	Flathead - Swan RD
Birch Creek Recreation Area	Kootenai - Fortine RD
Desert Mountain Parking Area	Flathead - Hungry Horse RD
Crane Mountain	Flathead - Swan RD
Swift Creek Parking Area	DNRC- Stillwater
Elk Meadows Parking Area	Lolo - Missoula RD
Earl Tennant Parking Area	Lolo - Missoula RD
East Fork Parking Area	Lolo - Missoula RD
Fish Creek Parking Area	Lolo - Missoula RD
Haugan Parking Area	Lolo - Superior RD
De Borgia Parking Area	Lolo - Superior RD
Martin Creek Trailhead	Kootenai - Cabinet RD
Fitzsimmons Trailhead	DNRC - Stillwater

Additionally, pamphlets containing both the QR code and URL link were prepared to provide access to the survey online. These pamphlets were distributed by placing them under windshield wipers on parked vehicles at the designated snowmobile access sites.

Figure 6

Image of the pamphlet distributed at survey sites



The second stage of the research design aimed to address the coverage error in MSA Districts 5 and 8 and ensure adequate representation of members of snowmobile clubs/organizations. Coverage error refers to the discrepancy between the target population (i.e., snowmobilers) and the subset of individuals (i.e., members of snowmobile clubs/organizations) included in the sampling frame.

To achieve a representative and generalizable sample of all snowmobilers and club members in western Montana, the scope of the study was expanded. A duplicate URL link to the survey was created and specifically shared with Montana snowmobile clubs and organizations in

western Montana, with a specific focus on MSA Districts 5 and 8. Contact information for club and organization representatives within the study area was identified, and they were then reached out to via phone or email. These representatives were requested to distribute the URL link to their club or organization members and encourage them to participate in the survey.

3.3 Survey Instrument

At the beginning of the questionnaire, a consent statement (Appendix C) was provided to individuals who received the survey via any mode (i.e., intercept, QR code, URL link).

Participants could proceed with the questionnaire by agreeing to take part in the research. Those who chose not to participate were directed to two non-response bias questions related to skill level and gender. Prior to implementation, the survey instrument (Appendix C) received approval from the University of Montana Institutional Review Board, ensuring compliance with voluntary participation requirements. Additionally, approval from land managers was obtained for all sites where intercept surveying took place.

The survey instrument (Appendix C) consisted of 22 items and 4 main sections, including two skip-logic questions, resulting in a total of 27 questions. For respondents who did not indicate membership in an organization or did not reside in the US, six questions were open-ended with numerical restrictions (e.g., What is your age?). Three questions were partially close-ended, offering an option to specify details when selecting 'other' (e.g., What club/organization are you a member of?). All other questions were closed-ended, providing pre-defined response choices (Appendix C).

Table 3

Example Survey Questions

Dimension		Example Question
Demographics		What is your age?
Types of Conflict (RQ1)	Observed behavior	How often have you observed the following situations/events while snowmobiling? (Matrix)
	Perceived problem behavior	When recreating, how much of a problem are the following events/situations? (Matrix)
	Bothered behavior	To what extent do you disagree or agree with the following statements? (Matrix)
Organizational Membership (RQ 2,3)		Are you a member to a snowmobile organization/group?
Perceived Responsible Recreation Behavior (RQ3)		Rate the appropriateness of the following behaviors while snowmobiling...
Visitor Characteristics		How would you rate your skill level as a snowmobiler?

3.4 Analysis Variables

The initial set of questions focused on gathering information about the respondents' characteristics, including the amount of time they spend participating in snowmobiling, the frequency of their recreational activities, their skill level, time spent riding, type of group they belong to, group size, and vehicle ownership.

To address Question 1, which aligns with previous research (Carothers et al., 2001; Vaske et al., 1995, 2007; Gibson & Fix, 2014), participants were asked how frequently they observed specific situations and events while snowmobiling. For instance, they were asked about the frequency of encountering situations such as engine noise, smelling exhaust, riding out of control, riding too fast, rude or discourteous behavior, passing too closely, and disturbing wildlife (Carothers et al., 2001; Vaske et al., 1995, 2007; Gibson & Fix, 2014). Respondents could select from response categories, "never," "1-2 times," "3-5 times," and "almost always" (Vaske et al., 1995, 2007). For analysis purposes, responses were recoded into "observed"

(experienced at least once) or "did not observe" (never experienced) (Vaske et al., 1995, 2007; Gibson & Fix, 2014). Additionally, participants were asked to evaluate if these situations/events were perceived as problems, and their responses were recorded on a 4-point scale ranging from "not a problem" to "extreme problem" (Gibson & Fix, 2014). For analysis, the responses were recoded into two categories: 'no problem' or "problem." Four questions were also included to assess how much respondents agreed or disagreed with statements such as "snowmobilers outside my group bother me," "hearing other snowmobilers bothers me," "smelling snowmobilers' exhaust bothers me," and "seeing other snowmobilers ride out of control bothers me." Responses were recorded on a 5-point scale from "strongly disagree" to "strongly agree" (Gibson & Fix, 2014). Among the questions included in the survey, the response to "snowmobilers outside my group bother me" was utilized as the categorical variable to determine latent-behavior conflict, while the remaining three questions were excluded from the analysis. The questions pertaining to "hearing other snowmobilers bothers me," "smelling snowmobilers' exhaust bothers me," and "seeing other snowmobilers ride out of control bothers me" were removed from analysis because they relied on direct observation of behaviors and were thus not considered latent (i.e., unobservable).

To address Question 2, a single question about respondents' membership affiliation was asked (i.e., Are you a member of a snowmobile organization?) to enable comparisons between groups. For members, an additional follow-up question inquired about the specific club or organization they belonged to. These responses would allow testing the relationships between the two subgroups (members and nonmembers) regarding their perceptions of conflict types experienced (R1) and the appropriateness of recreation behaviors (R3).

To address Question 3, the survey incorporated measures adapted from Backman et al. (2018) and TreadLightly! principles of responsible recreation behavior. Participants were asked to express their attitudes towards 11 specific recreation behaviors, which were categorized into responsible travel, respecting the rights of others, educating oneself, avoiding sensitive areas, and doing one's part. Respondents rated these behaviors on a scale of 1-7, where 1 denoted "very inappropriate" and 7 indicated "very appropriate." Three items were reverse coded, signifying that higher ratings reflected inappropriate behavior based on the TreadLightly! principles.

Finally, an additional set of demographic questions were included to determine the respondents' background and profile, such as age, gender, education level, income, and zip code. General means and frequencies were reported for these demographic items.

3.5 Sample Design

Considering the reported 393,508 annual snowmobile visits to Montana (Rivers & Menlove, 2006), the desired sample size aimed to achieve a $\pm 5\%$ sampling error at a 95% confidence level with an equal distribution between members and nonmembers, resulting in approximately 380 completed surveys (Vaske, 2019). However, since the exact number of snowmobile visitors at WMSAS is not precisely reflected in the reported visits, a target sample size of 250 was deemed sufficient.

To collect responses, a stratified random sampling method was employed. This method involves dividing the sample population into distinct, non-overlapping groups (strata) and then selecting a simple random sample from each stratum. The goal was to investigate differences among subgroups (i.e., members and nonmembers) based on the proposed hypotheses. To achieve this, the chosen stratification variable was membership affiliation. The sampling aimed

to ensure equal representation of each subgroup (i.e., 50% member responses, 50% nonmember responses). This method allowed the organization of the population into more meaningful and homogenous subgroups, enabling the testing of broader research questions' applicability and facilitating general comparative analysis. However, it is essential to acknowledge that this sampling method has limitations since the representation of the sample is not entirely controlled, and thus, generalizations beyond the identified subgroups of snowmobilers should be exercised with caution (Vaske, 2019). To be clear, the estimates, confidence intervals, model fitting, and hypothesis testing are referred to as 'indications' when reporting results for the broader western Montana snowmobile population.

3.6 Data Processing

The duplicated surveys were combined into a unified dataset using SPSS. To address any potential response issues, a variance variable was computed for Q20 ("appropriateness"), which included reverse-coded items, to identify any instances of "straight line" responses. Two cases with "straight line" responses were found, and their answers to Q20 were excluded from the analysis. Additionally, 7 incomplete responses were removed from the dataset (1 case with 0% completion and 6 cases with 10% completion). To ensure consistency across the various survey modes employed in the mixed-mode survey, a one-way ANOVA was conducted on the continuous data variables to compare the means between the survey modes at a 95% confidence interval ($p < .005$). Only one item exhibited a significant p-value of .002. Subsequently, an Eta-squared test was used to evaluate the strength of association between the two survey modes, resulting in a relatively small effect size of .042. Therefore, the variable was included in the analysis.

The final dataset consisted of 257 surveys, with 244 fully completed and 19 partially completed surveys. After data cleaning and validation, a total of 257 responses (including 6 refusals) were considered valid, of which 251 responses were used for the analysis (as shown in Table 4). Regarding membership, there were 242 responses, with 120 members and 122 nonmembers, achieving a balanced 50.5% to 49.5% ratio, in accordance with the stratified random sampling guidelines (Dillman et al., 2014). Site locations and club membership responses were carefully reviewed and adjusted to account for visited sites or clubs that were not originally listed but mentioned in the open text field (e.g., Anaconda Snowmobile Club, Helena Snowdrifters, Ponderosa Snowmobile Club).

After data cleaning, a total of 257 responses (including 6 refusals) were validated, resulting in 251 responses used for analysis (Table 4). In terms of membership, there were 242 responses, with 120 members and 122 nonmembers (49.5% to 50.5%). This distribution adhered to the stratified random sampling guidelines, achieving a 50/50 ratio (Dillman et al., 2014). Site locations and club membership responses were carefully reviewed and adjusted to account for visited sites or clubs that were not originally listed but mentioned in the open text field (e.g., Anaconda Snowmobile Club, Helena Snowdrifters, Ponderosa Snowmobile Club).

Table 4

Survey Responses by Type of Survey

Survey Type	Survey Responses	Percent of responses
On-site intercept	115	47.1%
Online pamphlet QR Code	28	10.9%
Online pamphlet URL Link	21	8.1%
Online Org. URL Link	87	33.9%
Total	251	100%

Data collection took place over a four-month period, spanning from December 17th, 2022, to March 12th, 2023 (Table 5). During this period, a total of 18 sites were visited, with a cumulative count of 32 visits. Intercept surveys were conducted at 11 of the 18 sites using a handheld tablet, resulting in a response rate of 95% with n = 121 and six refusals. Additionally, pamphlets containing a QR code and a URL link were placed on parked vehicles at all 18 sites. A total of 278 pamphlets were distributed, resulting in 49 recorded responses (17.6% response rate) via the QR code or URL link on the pamphlet. Two sites (Swift Creek and Birch Creek) did not yield any on-site intercept or QR or URL link responses from the pamphlets. Pamphlet distribution ended on February 23rd (Table 6). The response rate for the separate URL link sent to club contacts was not recorded.

Table 5

Dates Conducting On-Site (Intercept) Surveys

Day of the week	Days
Mondays (Holiday)	3
Friday	3
Saturday	5
Sunday	7
Total	18

Note. Surveys were collected December 17th, 2022 - March 12th, 2023. All Mondays were established Federal Holidays.

Table 6

Intercept Survey Locations, Units, Visits, Pamphlet Distribution and Hours Spent

Note. *Intercept surveys were conducted at these sites

Site	Land Mgmt. Unit	Site Visits	Pamphlets Distributed	Time spent @ Site (hrs.)
Lochsa Lodge	Nez Perce - Clearwater, Lochsa-Powell RD	2	3	4
*West Side Parking Area	Lolo - Seeley Lake RD	9	141	24.75
*Seeley Creek Parking Area	Lolo - Seeley Lake RD	2	1	1
*Lincoln Fairgrounds	Helena - Lewis & Clark NF	2	1	7.75
Swift Creek Parking Area	DNRC- Stillwater	1	2	1
Birch Creek Recreation Area	Kootenai - Fortine RD	1	3	1
*Olney Parking Area	DNRC- Stillwater	1	16	3
*Garnet Range Rd. Parking Area	DNRC - Clearwater	1	1	0.5
Skalkaho Snowpark	Bitterroot - Darby RD	1	13	2
*Lolo Hot Springs Parking Area	Lolo - Missoula RD	3	46	2.5
Fitzsimmons Trailhead	DNRC - Stillwater	1	5	1
East Fork Parking Area	Lolo - Missoula RD	1	5	0.25
*Earl Tennant Parking Area	Lolo - Missoula RD	1	1	1
*Canyon Creek Parking Area	Flathead - Glacier View RD	2	31	10
*Fish Creek Parking Area	Lolo - Missoula RD	3	8	1
*Crane Mountain	Flathead - Swan RD	1	1	1
Lost Trail Pass Snowpark Trailhead	Bitterroot - Sula RD	1	6	2
*Elk Meadows Parking Area, Lolo Pass VC	Lolo - Missoula RD	6	29	7
Total	18 sites	32	278	61.75

3.7 Analysis

The data was analyzed using the Statistical Package for the Social Sciences (SPSS) and Microsoft Excel (Table 7). Descriptive and summary statistics were computed, including means, frequencies, and standard deviations for all scale items related to visitor characteristics and demographic information.

Table 7

Data Analysis Methods for Research Questions

RQ	Data Analysis Method	Objective	Citation
RQ1	Descriptive Categorization	Categorize respondents into conflict typologies based on recoding of responses to explore the types of conflict that snowmobilers experience.	(Carothers et al., 2001; Vaske et al., 1995, 2007; Gibson & Fix 2014)
RQ2	Chi-square test	Test the relationship between types of conflict and memberships to a snowmobile organization to determine if members and nonmembers experience different types of conflict. Null Hypothesis: There is no relationship.	(Gibson & Fix, 2014)
RQ3	Independent Samples <i>t</i> Tests	Test the relationship between members and nonmembers perception of appropriateness of responsible recreation behaviors according to TreadLightly! principles.	(Vaske, 2019, Backman et al., 2018)

3.7.1 RQ1

What are the types of conflict that snowmobilers experience?

To address RQ1, following the approach of previous research (Carothers et al., 2001; Vaske et al., 1995, 2007; Gibson & Fix 2014), responses to questions regarding the frequency of eight observed behaviors (e.g., witnessing others riding out of control) were recoded into two categories: "did not observe" (i.e., never) and "observed" (i.e., 1-2 times, 3-5 times, almost

always). Similarly, responses about perceived problems were recoded using the same set of eight behaviors, categorized as "no problem" (i.e., selected 1 on a scale of 1-4) and "problem" (i.e., selected 2, 3, or 4 on a scale of 1-4). Additionally, responses regarding being bothered by other snowmobilers were recoded as "bothered" (i.e., strongly agree to agree) and "not bothered" (i.e., strongly disagree to neutral).

Through descriptive categorization, each individual's type of conflict was identified based on their responses to observed situations/events, problems with situations/events, and being bothered by others. Subsequently, comparisons were made based on the frequencies of these responses, and individuals were classified into one of five possible conflict typologies: no conflict, interpersonal conflict, interpersonal and social values conflict, social values conflict, and latent-behavior conflict (Figure 7).

Figure 7

Adapted Conflict Evaluation Table (Gibson and Fix, 2014)

		Perceived Problem with Behavior	
		No	Yes
Observed	No	No Conflict	Latent-Behavior Conflict (not bothered) ¹
	Yes	Social Values Conflict (bothered) ²	Social Values Conflict (bothered) ²
Not Observed	No	No Conflict	Interpersonal & Social Values Conflict (bothered) ³
	Yes	No Conflict	Interpersonal conflict (not bothered) ⁴

Note. Figure based on typology presented by Gibson and Fix (2014) and Vaske et al. (2007).

¹Respondents did not observe a given situation, perceived it to be a problem, and disagreed with the statement "Other snowmobilers in the area bothers me."

²Respondents did not observe a given situation, perceived it to be a problem or not a problem, and agreed with the statement “Other snowmobilers in the area bothers me.”

³Respondents observed a given situation, perceived it to be a problem, and agreed with the statement “Other snowmobilers in the area bothers me.”

⁴Respondents observed a given situation, perceived it to be a problem, and disagreed with the statement “Other snowmobilers in the area bothers me.”

3.7.2 RQ2

How do members and nonmembers of snowmobile organizations differ in the types of conflict they experience?

To address RQ2, a chi-square test of independence was employed using a 2x5 crosstabulation table to examine the relationship between the types of conflict experienced by respondents and their membership status. Membership (i.e., member or nonmember) was considered the dichotomous categorical independent variable under investigation, with the null hypothesis (H₀) stating that there is no association between the type of conflict a snowmobiler experiences and their affiliation to a snowmobile organization. The categorical dependent variable comprised the types of conflict (i.e., conflict typology) reported by respondents, including no conflict, interpersonal conflict, social values conflict, interpersonal and social values conflict, and latent-behavior conflict (Vaske, 2019).

The chi-square test of independence assessed the hypothesis by determining whether there were statistically significant differences in proportions between the various groups (i.e., members, nonmembers) based on the discrepancies between the expected and observed counts (Vaske, 2019). This test helps determine whether the rows and columns in the crosstabulation table are independent of each other.

The computation involved subtracting the expected frequency (assuming members and nonmembers experience the same types of conflict) from the observed frequency, squaring the

result, and then dividing it by the expected frequency, using either 3 or 4 degrees of freedom (5 conflict types -1 (column)) X (Member/Nonmember -1 (row)). A p-value of less than $<.05$ was considered statistically significant.

In cases where the statistical significance criterion was not met, practical significance was evaluated by calculating Cramer's V value, which measures the strength of association between categorical variables. Cramer's V was used because one of the variables (i.e., conflict typology) had more than three levels (Vaske, 2019). The analysis was conducted using SPSS software.

3.7.3 RQ3

How do members and nonmembers of snowmobile organizations differ in their perceptions of appropriate recreation behaviors?

To address RQ3, independent-samples t-tests were employed to compare means between two groups (i.e., members and nonmembers) and examine the null hypothesis (H_0) stating that there was no statistically significant difference in their attitude perceptions of appropriate recreation behaviors. The independent variable used in this analysis was membership status (i.e., member or nonmember). On the other hand, the dependent variable was the perceived appropriateness level, measured on a scale of 1-7 (1 being "very inappropriate" and 7 being "very appropriate"), for 11 variables based on the TreadLightly! Principles.

The alternative hypothesis (H_1) posited that there was a statistical relationship between members and nonmembers' attitude perceptions of appropriate recreation behaviors for each behavior. A significance level of $\alpha <.05$ was chosen based on the available sample size.

Before proceeding with the t-tests, a test for the equality of the sample variances was conducted using the F test (Levene's test) to determine whether the population variances were equal or unequal, assuming a normal distribution. Subsequently, using SPSS software, t-tests with equal variance were conducted to evaluate the rejection or non-rejection of the null hypothesis at the chosen significance level (Vaske, 2019).

Chapter 4: Results

This chapter presents the findings of the intercept survey data analysis in relation to the research questions. Tables and figures are provided for easy reference to the results discussed within each section addressing the research questions. Additionally, detailed data on visitor characteristics and demographics, along with relevant tables, can be found in the appendices for further exploration.

4.1 RQ1

What are the types of conflict that snowmobilers experience?

In general, snowmobilers reported minimal instances of witnessing or perceiving problems with the presented behaviors, such as being rude or discourteous. The responses regarding observed behaviors were analyzed to determine if respondents had witnessed the presented events or situations. Across seven of the eight variables, the majority of respondents (55% - 97%) reported "never" witnessing the behavior. The exception was the behavior of "hearing others," with the highest frequency (95.5%) of respondents indicating that they had observed this behavior "one or more times" according to the recoded categorization (Table 9).

However, it is worth noting that some respondents did report observing these behaviors to some extent for all seven items (Table 8).

Similarly, evaluations of perceived problems associated with the same eight variables were consistent among all snowmobilers who expressed that they did not have a problem with the selected behaviors. A majority of respondents (76% - 97%) categorized these behaviors as "not a problem" based on the recoded categorization (Table 11). Nonetheless, there were respondents who perceived a problem with the behaviors, although at a much lower frequency (Table 10).

The measurement of perceived latent-behavior conflict was based on a single item (Table 12), where respondents most frequently indicated "strongly disagree" with the statement "snowmobilers outside my group bother me." This resulted in 99.2% of respondents expressing that they were not bothered by other snowmobilers in the area after recoding the responses. Only two respondents "agreed" or "strongly agreed" that snowmobilers outside their group bothered them, compared to 239 respondents who "strongly disagreed" (179), "disagreed" (48), or were "neutral" (12).

Table 8

Response frequencies of Observed Behaviors prior to recoding

	<i>Hearing others</i>	<i>Smelling others exhaust</i>	<i>Riding out of control</i>	<i>Riding too fast</i>	<i>Being rude/discourteous</i>	<i>Passing too closely</i>	<i>Not yielding right-of-way</i>	<i>Disturbing wildlife</i>
Never	11	136	162	161	210	189	200	237
1-2 times	76	64	73	71	30	50	37	5
3-5 times	49	17	8	9	4	5	6	2
Almost always	108	27	2	3	-	-	-	-

Table 9*Behaviors Observed by Other Snowmobilers following recoding*

Observed Conflict Variable	Measure	Statistic	N=
Hearing others	Never	4.5%	244
	One or more times	95.5%	
Smelling others exhaust	Never	55.7%	244
	One or more times	44.3%	
Riding out of control	Never	66.1%	245
	One or more times	33.9%	
Riding too fast	Never	66.0%	244
	One or more times	34%	
Being rude/discourteous	Never	86.1%	244
	One or more times	13.9%	
Passing too closely	Never	77.5%	244
	One or more times	22.5%	
Not yielding right-of-way	Never	82.3%	243
	One or more times	17.7%	
Disturbing wildlife	Never	97.1%	244
	One or more times	2.9%	

Table 10*Response frequencies of Behaviors Perceived as Problems prior to recoding*

	<i>Hearing others</i>	<i>Smelling others exhaust</i>	<i>Riding out of control</i>	<i>Riding too fast</i>	<i>Being rude/discourteous</i>	<i>Passing too closely</i>	<i>Not yielding right-of-way</i>	<i>Disturbing wildlife</i>
1 (Not a problem)	227	235	183	184	187	183	191	192
2	7	4	25	33	21	29	19	9
3	4	3	21	22	16	14	15	8
4 (Extreme problem)	2	-	12	2	18	11	14	29

Table 11*Behaviors Perceived as Problems by Other Snowmobilers following recoding*

Problem Conflict Variable	Measure	Statistic	N=
Hearing others	Not a problem	94.6%	240
	Problem	5.4%	
Smelling others exhaust	Not a problem	97.1%	242
	Problem	2.9%	
Riding out of control	Not a problem	75.9%	241
	Problem	24.1%	
Riding too fast	Not a problem	76.3%	241
	Problem	23.7%	
Being rude/discourteous	Not a problem	77.3%	242
	Problem	22.7%	
Passing too closely	Not a problem	77.2%	237
	Problem	22.8%	
Not yielding right-of-way	Not a problem	79.9%	239
	Problem	20.1%	
Disturbing wildlife	Not a problem	80.7%	238
	Problem	19.3%	

Table 12*Latent-behavior Perceived as Bothered by Other Snowmobilers following recoding*

Latent Conflict Variable	Measure	Statistic	N=
Bothered by others	Not bothered	99.2%	241
	Bothered	0.8%	

The recoded responses were used to assign snowmobilers into specific conflict typologies, reflecting their perceived conflict experiences at WMSAS. Overall, a majority of

snowmobilers (ranging from 54% to 79%) were categorized as experiencing no conflict typology, except in the case of "hearing other snowmobilers." For this particular behavior, 89.4% of snowmobilers were categorized as experiencing interpersonal conflict. It is worth noting that although most snowmobilers observed this behavior, they did not necessarily find it problematic (4.9%), resulting in an interpersonal and social values conflict typology.

Regarding the behavior of disturbing wildlife, a relatively large percentage (17.1%) of snowmobilers experienced social values conflict. However, only a very small portion (1.7%) actually observed this behavior and perceived it as a problem. Riding out of control (13.3%) and riding too fast (13%) had the highest percentages of snowmobilers experiencing both interpersonal and social values conflict. Nevertheless, it is important to acknowledge that these percentages are still much smaller than those indicating no conflict for each variable.

In terms of latent-behavior, there was minimal evidence (0.8%) suggesting that snowmobilers at WMSAS experienced latent (i.e., unobservable) behaviors that bothered them. Only two respondents were categorized as experiencing latent-values conflict specifically related to hearing other snowmobilers. These individuals expressed a problem with hearing others, even though they did not witness the behavior themselves.

Table 13

Conflict Typologies of Snowmobilers at western Montana snowmobile access sites (WMSAS)

	<i>Hearing others</i>	<i>Smelling others exhaust</i>	<i>Riding out of control</i>	<i>Riding too fast</i>	<i>Being rude/discourteous</i>	<i>Passing to closely</i>	<i>Not yielding right-of-way</i>	<i>Disturbing wildlife</i>
No conflict	11 (4.5%)	129 (53.8%)	132 (54.8%)	131 (54.8%)	173 (71.5%)	154 (65.0%)	164 (68.9%)	188 (79.3%)
Interpersonal conflict	219 (89.4%)	104 (43.3%)	51 (21.2%)	51 (21.3%)	14 (5.8%)	29 (12.2%)	26 (10.9%)	3 (1.3%)
Social values conflict	1 (0.4%)	3 (1.3%)	26 (10.8%)	26 (10.9%)	36 (14.9%)	28 (11.8%)	31 (13.0%)	42 (17.7%)
Interpersonal and social values conflict	12 (4.9%)	4 (1.7%)	32 (13.3%)	31 (13.0%)	19 (7.9%)	26 (11.0%)	17 (7.1%)	4 (1.7%)
Latent-behavior conflict	2 (0.8%)	-	-	-	-	-	-	-
N=	245	240	241	239	242	237	238	237

4.2 RQ2

How do members and nonmembers of snowmobile organizations differ in the types of conflict they experience?

After categorizing the conflict typology of snowmobilers at WMSAS, a comparison was made between respondents identifying as members and nonmembers using a chi-square test to understand if they experienced different types of conflict (Table 14). Table 15 provided a visual representation for comparing conflict typologies between members and nonmembers. However, the results showed no statistical significance between the two groups, as the chi-square tests for each variable yielded a p-value greater than .05. As a result, the data failed to reject the null hypothesis (Ho) that members and nonmembers of snowmobile organizations experience the same types of conflict, suggesting no significant difference in the types of conflict experienced by snowmobilers based on their affiliation to a club or organization.

Table 14

Conflict Typologies of Members and Nonmembers at WMSAS

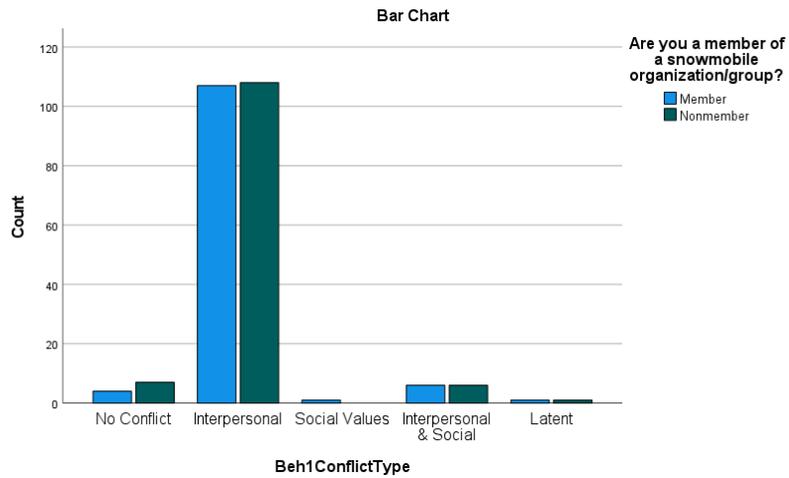
	<i>Hearing others</i>	<i>Smelling others exhaust</i>	<i>Riding out of control</i>	<i>Riding too fast</i>	<i>Being rude/discourteous</i>	<i>Passing to closely</i>	<i>Not yielding right-of-way</i>	<i>Disturbing wildlife</i>
No conflict								
Member	4 (3.4%)	66 (56.4%)	67 (56.8%)	65 (55.1%)	90 (75.6%)	83 (70.9%)	86 (72.9%)	99 (84.6%)
Nonmember	7 (5.7%)	63 (51.6%)	65 (53.3%)	66 (54.5%)	83 (68.0%)	71 (59.7%)	78 (65.5%)	89 (74.8%)
Interpersonal conflict								
Member	107 (89.9%)	50 (42.7%)	29 (24.6%)	28 (23.7%)	7 (5.9%)	14 (12.0%)	12 (10.2%)	1 (0.9%)
Nonmember	108 (88.5%)	53 (43.4%)	21 (17.2%)	23 (19.0%)	7 (5.7%)	14 (11.8%)	13 (10.9%)	2 (1.7%)
Social values conflict								
Member	1 (0.8%)	1 (0.9%)	7 (12.8%)	9 (7.6%)	12 (10.1%)	8 (6.8%)	9 (7.6%)	14 (12.0%)
Nonmember	0 (0.0%)	2 (1.6%)	19 (15.6%)	17 (14.0%)	23 (18.9%)	20 (16.8%)	22 (18.5%)	27 (22.7%)
Interpersonal and social values conflict								
Member	6 (5.0%)	0 (0.0%)	15 (15.7%)	16 (13.6%)	10 (8.4%)	12 (10.3%)	11 (9.3%)	3 (2.6%)
Nonmember	6 (4.9%)	4 (3.3%)	17 (13.9%)	15 (12.4%)	9 (7.4%)	14 (11.8%)	6 (5.0%)	1 (0.8%)
Latent-behavior conflict								
Member	1 (0.8%)	-	-	-	-	-	-	-
Nonmember	1 (0.8%)	-	-	-	-	-	-	-

N=	241	239	240	239	241	236	237	236
Chi-square value	1.786 ^a	4.388 ^a	6.909 ^a	2.954 ^a	3.756 ^a	6.215 ^a	7.348 ^a	5.971 ^a
P-value (x<.05)	.775	.223	.075	.399	.289	.102	.062	.113

Table 15

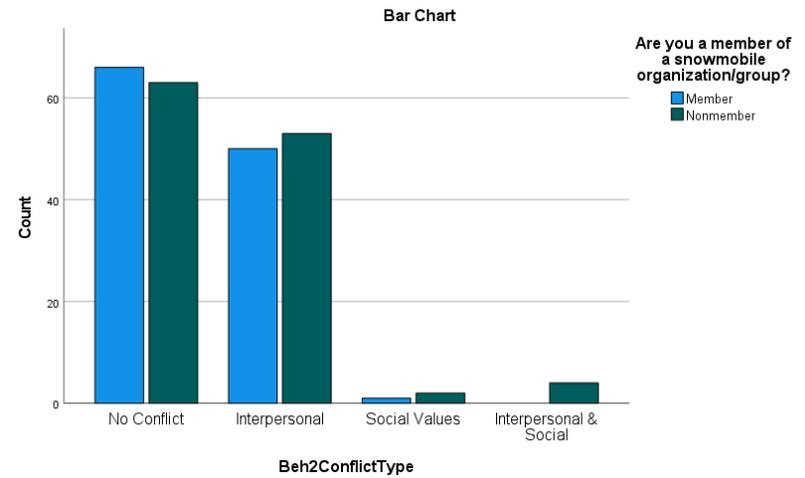
Conflict Typology Bar Charts of Members and Nonmembers

Hearing others

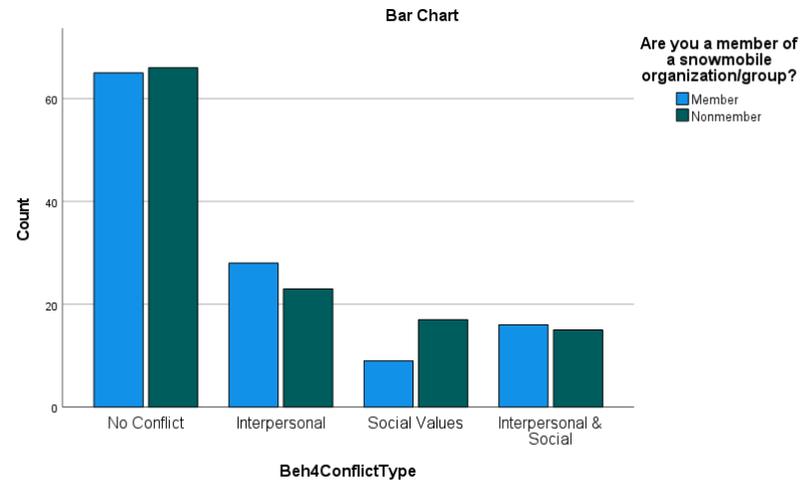
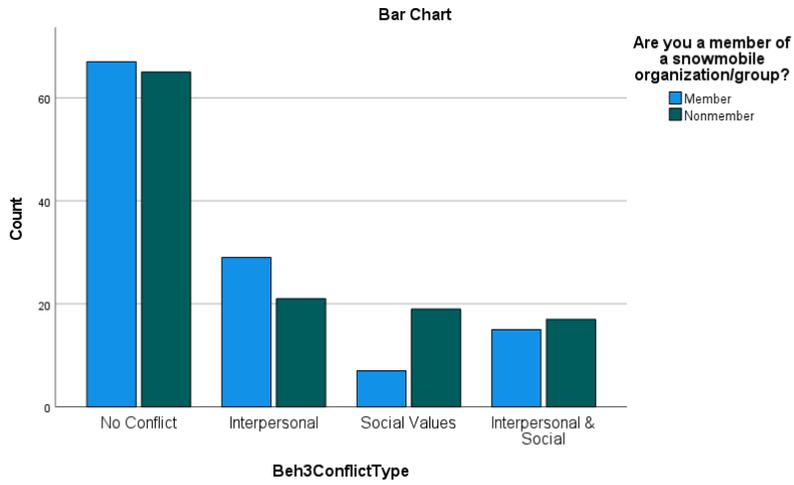


Riding out of control

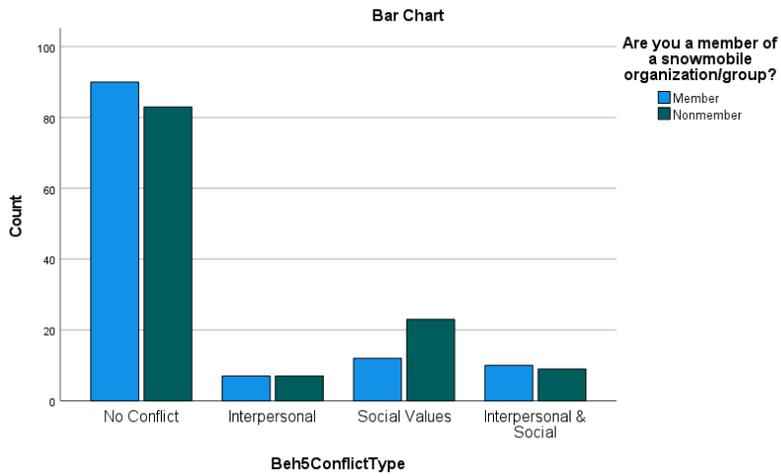
Smelling others exhaust



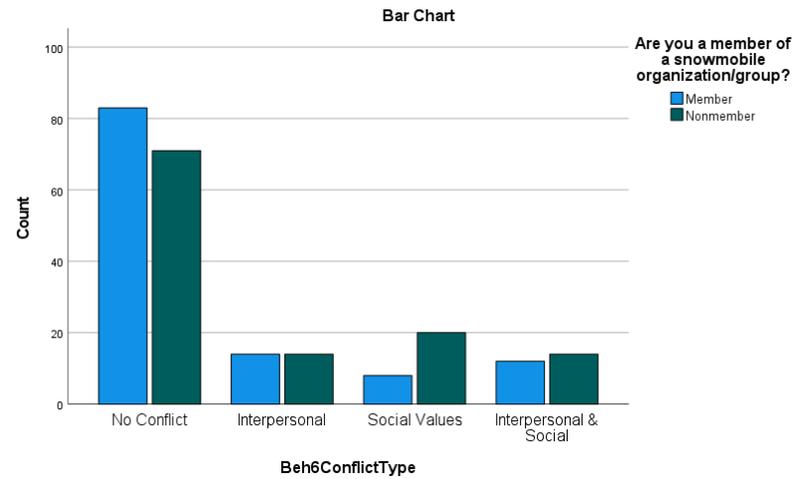
Riding too fast



Being rude/discourteous

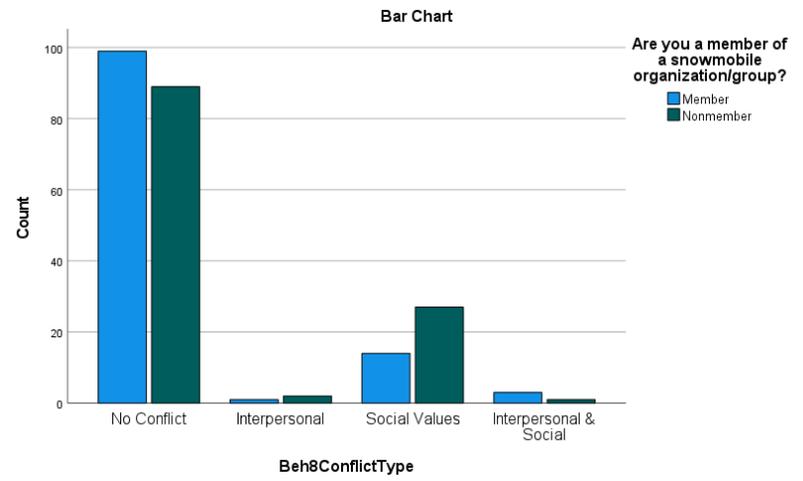
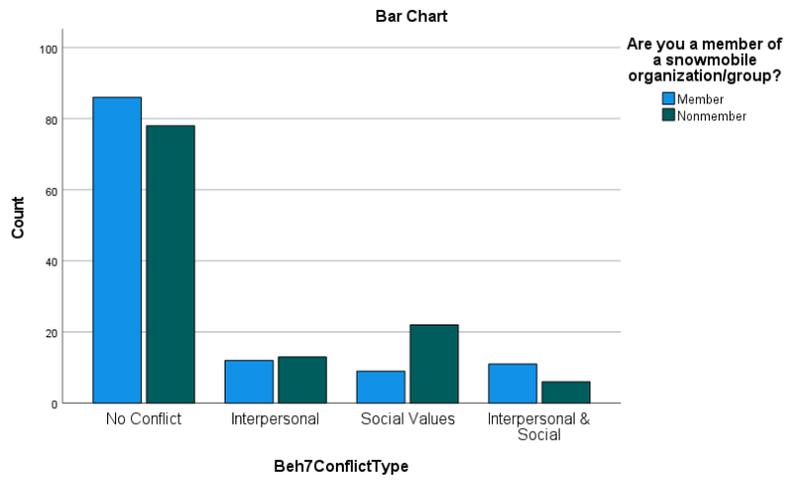


Passing too closely



Not yielding right-of-way

Disturbing wildlife



For exploratory purposes, each conflict typology grouping with counts larger than five was subjected to a bivariate crosstabulation (2x2) to identify specific behaviors (e.g., riding out of control) where conflict of any kind was present (e.g., interpersonal conflict, social values conflict, interpersonal and social values conflict). This analysis aimed to determine if there were any significant differences between members and nonmembers in experiencing these conflicts.

Instead of conducting a crosstabulation of all conflict typologies, individual typologies, such as social values conflict, were used as the dependent variable (i.e., experienced no social values conflict or experienced social values conflict concerning the behavior) based on the independent variable of being a member or not. The results mostly aligned with the aggregated conflict typology categorizations, but there were a few specific behavior-conflict measurements that showed statistical significance with a p-value of $<.05$ (Table 16). For statistical significance, we considered a chi-square value greater than 3.841, using a significance level at .05 and $df=1$ (Vaske, 2019).

Additionally, effect sizes (i.e., phi value) were reported to gauge the strength of the association. In all cases, the phi value, ranging from 0 to 1, was closer to 0, indicating minimal association between membership and the type of conflict experienced by the respondents. This outcome may be due to individuals who experienced social values conflict considering the behavior a problem and also witnessing the behavior, resulting in different categorizations within the interpersonal and social values conflict typology during the previous crosstabulation analysis.

Table 16

Bivariate Crosstabulation of Specific Conflict Typology of Members and Nonmembers

Conflict Variable	N=	Member (%)	Nonmember (%)	Chi-square value	P-value (x<.05)	Phi value
--------------------------	-----------	-------------------	----------------------	-------------------------	---------------------------	------------------

Social Values						
Riding out of control	240	18.5	29.8	4.154a	.042	.042
Social Values						
Passing too closely	236	16.9	28.8	4.707a	.030	.030

4.3 RQ3

How do members and nonmembers of snowmobile organizations differ in their perceptions of appropriate recreation behaviors?

Before conducting hypothesis testing for RQ3, descriptive statistics were gathered. The reverse-coded questions were recoded to align with the other scale items, creating an average response of appropriateness for each respondent, ranging from 1 (very inappropriate) to 7 (very appropriate). The descriptive statistics for all respondents were calculated, showing an average response of 6.13 on a scale of 1-7, with a minimum response of 2.91 and a maximum of 7.00, and a standard deviation of .649 (Table 17). Detailed breakdowns of each variable and their descriptive statistics were also provided (Appendix G).

Table 17

Index of Responses to Appropriate Recreation Behaviors Descriptive Statistics

N=	Range	Minimum	Maximum	Mean	SD
217	4.09	2.91	7.00	6.13	.649

To address RQ3, independent-samples t-tests were utilized (Vaske, 2019) to determine whether there were statistically significant differences in the attitudes towards appropriate recreation behaviors between members and nonmembers. The Lavene's test for equality of variance did not yield statistical significance, indicating that equal variance could be assumed for all values except for the variable related to "wearing an avalanche transceiver, shovel, and probe

on your body at all times," which showed significance at the 0.041 level (Table 18). For this particular variable, equal variance was not assumed, and the t-value for the equality of means was used to ascertain significance, reporting a significance level of 0.231. This suggests that the mean scores for members and nonmembers were not significantly different (Table 18).

Given the unequal variances for this variable, the effect size (Cohen's d) was calculated, resulting in a value of 0.158, indicating a minimal effect size. In general, based on the independent-samples t-tests, we would fail to reject the null hypothesis that members and nonmembers have different attitudes towards appropriate recreation behaviors, except for one variable which showed a small effect size.

Table 18*Perceived Appropriateness Levels to Responsible Recreation Behaviors Between Members and Nonmembers*

Variable (Recreation Behavior)	Combined (mean)	Combined (SD)	Member (mean)	Member (SD)	Nonmember (mean)	Nonmember (SD)	F	t	df	P- value
Traveling only in areas open to snowmobiles	6.37	1.54	6.52	1.47	6.23	1.60	2.97	1.40	226	.086
Traveling off trail to experience the natural environment	6.33	1.36	6.45	1.33	6.22	1.38	2.88	1.32	227	.091
*Participating in "high-marking" in an avalanche prone area	2.92	2.04	2.79	2.07	3.05	2.01	0.27	0.98	226	.606
*Traveling through private property to reach a destination	1.91	1.64	1.84	1.66	1.97	1.63	0.05	0.62	222	.834
Keeping speeds low around crowds and staging areas	6.71	0.99	6.67	1.01	6.75	0.96	0.90	-.58	226	.344
Contact the land manager for area restrictions, closures and permit requirements	6.12	1.51	6.05	1.58	6.18	1.44	0.96	-.63	224	.327

Wearing an avalanche transceiver, shovel and probe on your body at all times	6.55	1.14	6.65	1.08	6.47	1.20	4.21	1.20	226	.041
*Approaching wildlife for a photo	1.76	1.29	1.61	1.26	1.90	1.31	2.77	1.67	225	.098
Avoiding areas of low snow	5.55	1.91	5.58	1.90	5.52	1.93	0.00	0.23	227	.975
Prevent unnecessary noise with a well-maintained vehicle	5.76	1.67	5.93	1.58	5.59	1.73	2.46	1.54	226	.118
Carry a trash bag and pick up litter left by others	6.48	1.23	6.57	1.10	6.41	1.40	3.63	0.99	227	.058

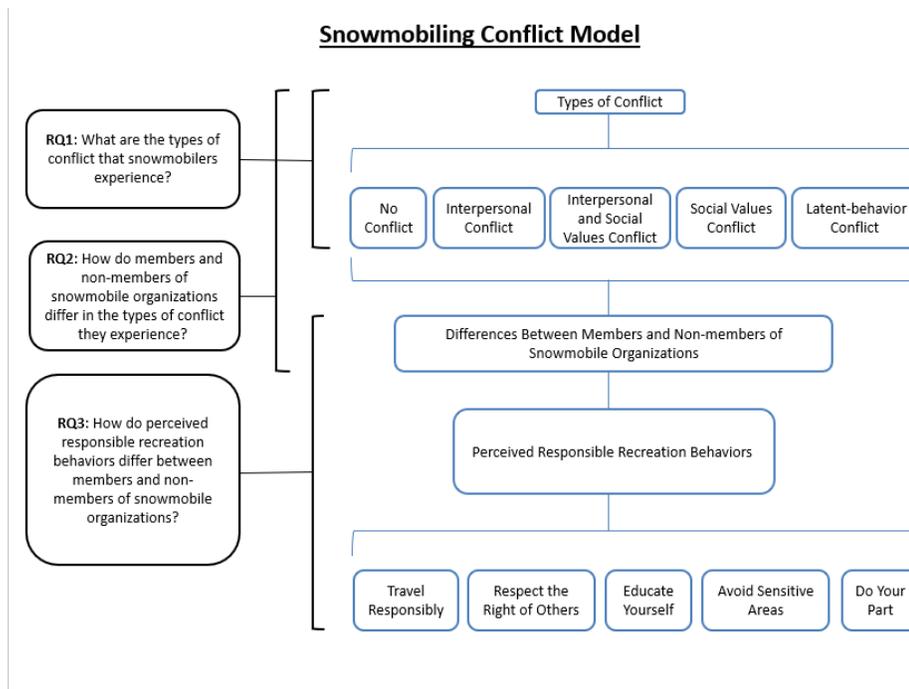
Note. *Reverse coded variables

Chapter 5: Discussion

This study aimed to investigate the relationship between conflict and recreation behaviors among snowmobilers based on their affiliation with snowmobile organizations. The hypotheses (RQ2 and RQ3) failed to support the idea that organization affiliation could predict the types of conflict experienced by snowmobilers or their perceptions of appropriate recreation behaviors. Overall, snowmobilers at WMSAS reported very minimal conflict, and the research revealed a general alignment between their values, perceptions, and behaviors during snowmobiling, leading to the inability to fully support the hypothesized model (Figure 8). Despite this, certain trends and findings emerged from the research, offering valuable insights for managers and future studies. These implications can help shape management practices and inform further investigations in the field.

Figure 8

Proposed modified model of conflict typology and variations in responsible recreation behaviors based on snowmobile organization membership



5.1 What are the types of conflict that snowmobilers experience?

The evidence from the WMSAS survey suggests that snowmobilers experienced minimal conflict overall. Among the behaviors observed, "hearing others" was the most commonly reported, but it was not perceived as a significant problem by almost 95% of respondents. It is important to note that in snowmobiling, engine noise is generally accepted and even praised, which may explain the high observation rate and low perception of it as a problem.

Interpersonal conflict, often linked to factors like crowding, specialization, place attachment, or activity style, is commonly found among recreationists in similar activities. However, this study did not entirely align with previous research in this regard. While some behaviors were observed more frequently than perceived as problems (interpersonal conflict), there were also instances where the opposite was true (social values conflict).

Social values conflict, characterized by perceiving a behavior as problematic, was more prevalent among snowmobilers in the WMSAS. Behaviors that were less observed or not

observed at all tended to be perceived as more problematic. This suggests that snowmobilers may be more sensitive to potential conflicts within the group and emphasize perceived problems more than observed ones, possibly reflecting their values and expectations for responsible behavior.

The measurement of latent-behavior conflict, as proposed by Gibson and Fix (2014), did not yield significant findings in this study. Latent-behavior conflict refers to instances where individuals have an issue with behaviors they did not personally witness. Its limited detection supports the idea that higher levels of social values conflict may lead to lower levels of latent-behavior conflict.

However, relying on a single measure for latent-behavior conflict can have limitations. Incorporating other measures, such as place attachment and expectations, could offer a more comprehensive understanding of latent-behavior conflict. Moreover, the procedural categorization of conflict typologies may not capture all forms of conflict, potentially leading to misclassifications when latent-behavior conflict occurs.

In summary, the research reveals intriguing trends and considerations for conflict among snowmobilers, offering valuable insights for future studies to explore the complex interplay between behavior, values, and perceptions within recreational settings.

5.1.1 Management Implications

For managers tasked with assessing conflict among recreationists, it is essential to recognize that some behaviors may not be witnessed directly by snowmobilers but can still be perceived as problematic. In the case of WMSAS, discourse behavior, which includes actions that deviate from the established norms of the snowmobiling group, may be observed by fewer snowmobilers but is still regarded as somewhat problematic. To address this, managers should

focus on identifying behaviors that are most perceived as problems, such as "riding out of control" and "riding too fast." Implementing direct management measures, such as speed limits and designated directional trails or lanes along routes, can help mitigate these issues effectively. For concerns related to "disturbing wildlife" and "being rude/discourteous," managers can take an educational approach. Providing information on the impacts of such behaviors and promoting stewardship through guidelines like the TreadLightly! principles has been proven effective in other studies. By educating snowmobilers about responsible behavior and the potential consequences of their actions, managers can encourage a culture of respectful and conscientious recreation (Backman et al., 2018; Lowhan et al., 2013; Mueller et al., 2018; Taff et al., 2014; Vagias et al., 2014).

Although this study did not focus on conflicts with other user groups, managers should still emphasize the importance of responsible interactions with other users. Encouraging snowmobilers to be welcoming and considerate towards other user groups and resolving conflicts diplomatically can foster a positive recreational environment. Managers should convey to snowmobilers that they share a responsibility to maintain harmonious relationships with both other user groups and fellow snowmobilers within their own group. This inclusive approach can enhance the overall recreational experience and contribute to sustainable and enjoyable outdoor activities for everyone involved.

5.2 How do members and nonmembers of snowmobile organizations differ in the types of conflict they experience?

Schneider (2000) emphasizes the importance of studying conflict in recreation systematically for the benefit of leisure customers, organizations, and science. Understanding recreation conflict involves examining multiple factors, including the role of snowmobile

organizations. This research aimed to determine whether membership in such organizations had any correlation with the types of conflict experienced by snowmobilers at WMSAS. While the results did not reveal any statistically significant differences in the types of conflict among snowmobilers based on membership, they do provide valuable insights for further investigation.

Previous studies have suggested that conflict can arise even within a group of like-minded recreationists (Thapa and Graefe, 2003; Vaske et al., 2000; Vaske et al., 2004). This study ventured to explore conflict from an organizational level, focusing on a specific group of recreationists, which adds a unique perspective to existing research. A study by Mueller and Graefe (2018), which assessed conflict among climbers who were members of the American Alpine Club, yielded results that align with the conflict typologies found among WMSAS snowmobilers.

Although there were no statistically significant findings related to snowmobile organization membership, some minor differences emerged. Nonmembers were more prone to experiencing social values conflict, while members were more frequently categorized into the "no conflict" group. This indicates that nonmembers perceived problems with behavior more frequently than members. Consequently, the higher percentage of nonmembers perceiving these problems could be a contributing factor to the overall higher percentage of social values conflict experienced by snowmobilers, rather than interpersonal conflict.

Moreover, the study highlights the significance of skill level differences (referred to as "specialization") in determining conflict (Mueller & Graefe, 2018; Thapa & Graefe, 2003; Vaske et al., 2004). An exploration of the data revealed a statistically significant difference in skill levels between members and nonmembers ($p < .001$), with 67% of members reporting advanced or expert riding skills, compared to 40% of nonmembers. While skill level measurement can be

challenging, this research indicates that it may indeed impact conflict among recreationists, even within the same group. As such, measuring and reporting skill levels remains crucial when seeking to understand conflict dynamics (Vaske, 2003).

In conclusion, this study emphasizes the complexity of recreation conflict and the importance of examining it from various perspectives. While snowmobile organization membership did not directly relate to the types of conflict experienced, understanding skill levels and perception of behaviors provides valuable insights for managing conflicts in recreation settings. Further research in this area can aid managers and researchers in fostering enjoyable and harmonious recreational experiences for all participants.

5.2.1 Management Implications

Managers recognize the importance of comprehending the values and behaviors of diverse user groups. This research, along with previous studies (Mueller & Graefe, 2018; Thapa & Graefe, 2003; Vaske, 2003), reinforces the need for managers to closely examine dynamics within user groups. Within the snowmobile community, it is crucial to offer a wide range of experiences to cater to all levels of recreationists, as recommended by the 2015 USFS OSV Rule (USFS, 2015). This involves providing designated routes, considering preferences for winter recreation activities, and continuously monitoring the activity.

To address perceived problems, targeted strategies and direct management can be implemented. Developing separate trails (zoning) and employing designated signage for less skilled riders could be effective in mitigating issues related to behaviors like passing too closely and not yielding the right of way. By providing appropriate infrastructure and guidance, managers can create a safer and more enjoyable snowmobiling environment for all participants.

5.3 How do members and nonmembers of snowmobile organizations differ in their perceptions of appropriate recreation behaviors?

Previous literature has emphasized the use of guidelines such as Leave No Trace (LNT) and TreadLightly! to evaluate the effectiveness of indirect management strategies in mitigating negative behaviors (Backman et al., 2018; Vaske et al., 1995). Additionally, a study by Mueller et al. (2018) found that TreadLightly! guidelines, as an indirect management approach, were effective in identifying and addressing resource and social impacts in protected areas, particularly for motorized users.

The objective of this research was to examine whether organizational membership influenced the perception of appropriate recreation behaviors. The TreadLightly! guidelines were adapted to assess the attitude perceptions of members and nonmembers towards different behaviors (Backman et al., 2018). The findings indicated that members and nonmembers of snowmobile organizations at WMSAS generally held similar attitudes towards responsible recreation behaviors. Only one behavior, "wearing an avalanche transceiver, shovel, and probe on your body at all times," showed a statistically significant difference ($p = .041$) but with a minimal effect size (.158). Fisher et al. (2022) suggested that interventions such as daily bulletins regarding the use of gear in avalanche terrain could enhance awareness and safety.

The results of the study were consistent with similar research conducted among comparable recreationist groups (Taff et al., 2014), indicating a shared understanding of appropriate recreation behavior. Snowmobilers at WMSAS exhibited consistent attitudes towards these behaviors, as reflected in their average mean scores, ranging from 5.0 (participating in "high marking" in an avalanche-prone area) to 6.7 (keeping speeds low around crowds and

staging areas). Notably, the behavior of "high marking" in avalanche-prone areas was not specifically addressed in the TreadLightly! guidelines, highlighting the need for avalanche education and decision-making among snowmobile recreationists (Fisher et al., 2022; Haegeli & Strong-Cvetich, 2020).

The congruency in attitudes towards appropriate recreation behavior suggests effective communication and education efforts targeting snowmobilers at WMSAS. Clubs and organizations in the area play a significant role by providing educational materials on their websites, including TreadLightly! guidelines, route maps, trail conditions, and information on snowmobiling activities and training opportunities (e.g., learn-to-snowmobile classes, avalanche education). Being part of these clubs and organizations exposes members to shared norms and expectations, which can influence their attitudes towards appropriate behavior within their social groups (Dennis & Zube, 1988; Havitz & Howard, 1995).

While organizational affiliation does not directly explain misaligned behaviors, the presence of these clubs and organizations within the snowmobiling community has fostered a common understanding of appropriate recreation behavior. Although they may not have direct control over snowmobilers' actions, club members, including trail users and maintenance professionals (e.g., groomers), are well-positioned to encourage and educate others. By identifying and engaging with these social groups (i.e., snowmobile clubs/organizations), managers can effectively identify stakeholders and leaders within the community to address behaviors and challenges within the WMSAS.

5.3.1 Management Implications

Evidently, snowmobilers at WMSAS demonstrate a strong grasp of appropriate recreation behaviors. Managers should carefully assess the approaches and strategies employed

at these sites to inform future planning and management decisions. Nevertheless, it is essential for managers to conduct further research to ascertain the applicability of these findings across diverse demographics and various types of protected areas (Taff et al., 2014).

Continued emphasis on education and the implementation of indirect strategies is crucial to enhance awareness of TreadLightly! guidelines and other responsible recreation behaviors. Collaborating with organizations and clubs can serve as an effective means to disseminate messages regarding responsible recreation behavior, particularly since many of these groups are actively involved in the maintenance and planning processes within these areas. These clubs also foster a sense of social cohesion and group identity that can be leveraged to address discourse behaviors and promote appropriate recreation practices through the establishment of group norms.

Moreover, managers should collaborate with researchers to investigate whether snowmobilers' understanding of appropriate recreation behaviors translates into observable actions. This will enable a better comprehension of the alignment between intentions and actualized responsible recreation behaviors among snowmobilers at WMSAS. By understanding this intersection, managers can better tailor their strategies to mitigate potential conflicts and accommodate new users and visitors to the area.

Chapter 6: Conclusion

6.1 General Conclusions

In summary, this research explored the dynamics of conflict and recreational behaviors among snowmobilers, focusing on the impact of organizational affiliation. The results provided

insights into various aspects of the snowmobiling community within the WMSAS region. Overall, the findings indicated that conflict among snowmobilers in the study area is generally limited. While some instances of interpersonal and social values conflict were observed, most respondents reported either no conflict or latent-behavior conflict, suggesting that unnoticed behaviors didn't trouble most snowmobilers.

Notably, the study revealed no statistically significant distinctions in the conflict types experienced by members and nonmembers of snowmobile organizations. This implies that organizational membership's influence on conflict patterns among WMSAS snowmobilers is relatively weak. However, it's important to note that nonmembers tended to perceive specific issues more frequently than members did, potentially contributing to a higher occurrence of social values conflict within the snowmobiling community.

Furthermore, this research provided valuable insights into the attitudes regarding appropriate recreational behaviors among snowmobilers. The alignment of these attitudes among both members and nonmembers demonstrates the effectiveness of educational efforts and communication strategies regarding responsible recreation practices within the snowmobiling community. This success is likely facilitated by clubs and organizations that furnish educational materials and cultivate a shared understanding of norms and expectations for suitable behavior.

6.2 Limitations

Nevertheless, the study has certain limitations that should be acknowledged. Firstly, its geographic specificity to the WMSAS region might limit the applicability of findings to other snowmobiling areas with distinct geographical and social attributes. Secondly, reliance on self-

reported data introduces the possibility of response bias, potentially affecting data accuracy. Despite efforts to ensure participant confidentiality, the potential for response bias remains.

Moreover, the study's sample size could constrain its statistical power and sensitivity to subtle differences. Although attempts were made to achieve a representative sample, selection bias might have influenced the results. Additionally, the research centered solely on organizational membership as an indicator of potential conflict and attitude differences, neglecting other factors like personal values, prior experiences, or demographics. Exploring a broader range of variables in future research could yield a more comprehensive understanding of the underlying dynamics.

Furthermore, the study's categorization of conflict types might not fully capture the intricacies of conflict experiences among snowmobilers. Employing more nuanced methods, including qualitative approaches, could provide deeper insights into the factors contributing to conflict and perceived issues. Additionally, adjusting the study's items and questions to better address intra-group conflict could enhance its accuracy. For instance, framing questions positively could provide a more balanced perspective on the topic.

Lastly, as with any research, unforeseen confounding variables might not have been considered. Future research could overcome these limitations by employing larger and more diverse samples, incorporating multiple data sources, and using mixed method approaches to gain a more holistic understanding of conflict and recreational behaviors among snowmobilers.

6.3 Management Implications and Future Research

Regarding management implications and future research, the findings emphasize the importance of ongoing education and indirect management strategies to promote responsible

recreation practices. Collaborating with snowmobile organizations can play a pivotal role in disseminating messages and cultivating group norms that encourage appropriate behavior and address conflicts. The concept of "co-creation" can be employed effectively to engage users and address user group concerns (Borden & Mahamane, 2020). Given the lack of intra-group conflict among snowmobilers in the WMSAS, it would be valuable to investigate why this user group shares such consistent values regarding appropriate recreation. Exploring how different groups manage access and support for their recreational activities could shed light on attitudes and behaviors that protect their preferred form of recreation.

Further research should aim to validate these findings across various demographics and protected areas. Additionally, examining the interplay between intended and realized responsible recreation behaviors would provide deeper insights into management strategies' effectiveness and user compliance levels. Utilizing a combination of quantitative and qualitative methods, including mixed-mode surveys, could provide a more comprehensive understanding of the user group's dynamics (Vaske, 2019).

Exploring conflicts within user groups designated by managers is another avenue for research. Research has historically focused on conflict between user groups or sub-groups of recreationists, redirecting a focus to address intra-group conflict that assess differing experiences, expectations, motivations (Paterson, 1972) could be useful when trying to address what types of concerns and conflicts a specific user group is having while recreating. Shifting focus from conflicts between different user groups to conflicts within a single group (e.g., managers and users) could provide insights into how management practices impact user experiences and potential conflicts.

In conclusion, this study contributes valuable insights to the realm of recreation management, offering guidance for managers seeking to enhance visitor experiences, minimize conflicts, and promote sustainable recreation practices both within and beyond the WMSAS. By adopting a comprehensive and collaborative approach, managers can create an environment that caters to the diverse needs of snowmobilers and other visitors while safeguarding natural resources for future generations.

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Appendices

Appendix A: Snowmobile Club Information

Western Montana Snowmobile Clubs		
<p>Ten Lakes Snowmobile Club PO Box 404 Eureka, MT 59917 406-297-3377 Facebook</p>	<p>Lincoln County Sno-Kat Club PO Box 1180 Libby, MT 59923 406-827-0524 Website Facebook</p>	<p>Seeley Lake Driftriders PO Box 174 Seeley Lake, MT 59868 406-677-7777 Website Facebook</p>
<p>Troy Snowmobile Club PO Box 1002 Troy, MT 59935 406-295-4322 Website</p>	<p>Cabinet Ridge Riders PO Box 1577 Trout Creek, MT 59874 406-827-3226 Facebook</p>	<p>Missoula Snowgoers PO Box 2441 Missoula, MT 59806 406-370-8819 Website Facebook</p>
<p>Flathead Snowmobile Association PO Box 5041 Kalispell, MT 59903 406-871-4606 Website Facebook</p>	<p>Montana Nightriders PO Box 420242 Haugen, MT 59842 406-544-5416 Website Facebook</p>	<p>Bitterroot Ridge Runners 220 Camas Creek Lp. Hamilton, MT 59840 406 370-8132 Website Facebook</p>
<p>Ponderosa Snow Warriors PO Box 933 Lincoln, MT 59639 406-362-3334 Facebook</p>	<p>Helena Snowdrifters PO Box 5505 Helena, MT 59604 406-202-2044 Website Facebook</p>	<p>Anaconda Snowmobile Club 45 Fire Ln. Anaconda, MT 59711 406-563-7789 Facebook</p>
<p>Big Hole Snowmobile Club PO Box 141 Wisdom, MT 59761 406-370-2587 Facebook</p>	<p>Mining City Trail Riders PO Box 4885 Butte, MT 59702 406-782-4613</p>	<p>Jackpine Savages PO Box 65 Wise River, MT 59762 406-267-3389 Facebook</p>
<p>Beaverhead Sno-Riders PO Box 867 Dillon, MT 59725 406-925-0501</p>	<p>Vigilante Snowmobilers PO Box 145 Virginia City, MT 59755 406-581-1776</p>	

Appendix B: TreadLightly! Principles for Snow Machining

Travel Responsibly:

Travel responsibly on designated roads, trails and areas.

- Travel only in areas open to your particular tracked snow machine.
- Comply with signs and respect barriers.
- Avoid trails with inadequate snow cover.
- Avoid riding in potential avalanche areas. Periodically check for clues to an unstable snowpack. Use terrain to your advantage, avoiding steep slopes, cornices and gullies or depressions.
- One rider at a time on slopes.
- When climbing a hill, approach the summit with caution.
- Do not ride off cornices.
- Avoid riding on frozen waterways and lakes.
- Be aware of unmarked hazards or obstacles hidden beneath the snow.
- Travel at reasonable speeds.
- When approaching a corner, reduce your speed to avoid sliding.
- Pump your brake when going downhill to avoid locking the brakes.
- Cross roadways at a 90-degree angle.
- When riding at night, use extra caution, wear reflective clothing and reduce your speed.
- Observe the person capacity/ weight limit for your particular machine.
- Buddy up with two or three riders, reducing your vulnerability if you have an accident or breakdown.

- Listening to headphones or ear-buds can make it difficult to hear and communicate with other recreationists. In some areas it is illegal to operate snow machines with both ears covered.
- Don't mix riding with alcohol or drugs.

Respect the Rights of Others:

Respect the rights of others, including private property owners, all recreational users and campers so they can enjoy their recreational activities.

- Be considerate of others on the trail.
- Keep speeds low around crowds and staging areas.
- Ride single file, keep to the right and pass on the left only when the trail is clear.
- When stopping on the trail, pull your snow machine as far right and off the trail as possible.
- Yield the right-of-way to skiers, snowshoers and other non-mechanized forms of travel, as well as those passing or traveling uphill.
- Use common trail hand signals to communicate with your group and other riders. If crossing private property, be sure to ask permission from the landowner(s).

Educate Yourself:

Educate yourself prior to a trip by planning ahead, obtaining travel maps and regulations from public agencies, taking recreation skills classes and knowing how to operate your equipment safely.

- Obtain a motor vehicle use map, and over snow vehicle use map of your destination, if available, and determine which areas are open to snow machines.

- Contact the land manager for area restrictions, closures and permit requirements.
- Take a snow machine safety course.
- Take an avalanche class. They provide skills on assessing snow conditions, performing rescues and using safety equipment.
- Always check the weather forecast and avalanche conditions in advance and the day of.
- Make a realistic plan and stick to it. Always tell someone of your travel plans. If conditions change, be prepared to alter plans to ensure safety.
- Understand how to operate your vehicle and its controls.
- Wear an avalanche transceiver, shovel and probe on your body at all times.
- Prepare for the unexpected by packing a small backpack full of emergency items.
- Wear a helmet, eye protection and other safety gear.
- Layer clothing and wear a durable waterproof outer shell and footwear.
- Make sure your snow machine is mechanically up to the task.
- Be prepared with tools, supplies and a spill kit for trailside repairs.
- If you suffer a breakdown, stay with your snow machine and stay on the trail.
- If a person develops hypothermia, warm the person up by rubbing them vigorously and getting them into dry clothes. Give them warm non-alcoholic liquids.

Avoid Sensitive Areas:

Avoid sensitive areas such as meadows, lakeshores, wetlands and streams. Stay on designated routes.

- Motorized and mechanized forms of travel are not allowed in designated Wilderness Areas.

- Low snow, don't go. A snow machine's spinning track(s) damage plants and soils just below the snow's surface. Hill climbing in these conditions is especially damaging.
- Do not disturb historical, archeological or paleontological sites.
- Be respectful of wildlife's wintering habitats.
- Avoid "spooking" livestock and wildlife and keep your distance.

Do Your Part:

Do your part by modeling responsible behavior, leaving the area better than you found it, properly disposing of waste, minimizing the use of fire, avoiding the spread of invasive species, and restoring degraded areas.

- Carry a trash bag on your snow machine and pick up litter left by others.
- Pack out what you pack in. Dispose of all sanitary waste properly by packing it out or bury it 6 to 8 inches deep in soil.
- To minimize harmful emissions, keep your engine in tune.
- Prevent unnecessary noise created by a poorly tuned vehicle or revving your engine. Use proper silencers on exhausts, which meet regulatory decibel levels.
- Build a trail community. Get to know other types of recreationists that share your favorite trail

Appendix C: Survey Instrument

- Date and time of survey (automatic through Qualtrics Platform)
- Type of survey (i.e., Intercept, URL, QR code) (automatic through Qualtrics platform)
- Consent Statement: You are invited to participate in a research project Exploring Recreation Conflict and Behaviors Among Members and Nonmembers of Snowmobile Organizations in western Montana. This online survey should take about 10 minutes to complete. Support for this research is provided by the Institute for Tourism and Recreation Research, intended to improve and understand the winter recreation experience of visitors and fellow Montanans. Participation is voluntary, and responses will be confidential. You have the option to not respond to any questions that you choose. Participation or nonparticipation will not impact your relationship with the University of Montana. Submission of the survey will be interpreted as your informed consent to participate and that you affirm that you are at least 18 years of age. If you have any questions about the research, please contact:

Liam Harry at liam.harry@umconnect.edu

Dr. William Rice at william.rice@umontana.edu

Dr. Jennifer Thomsen at jennifer.thomsen@mso.umt.edu

If you have any questions regarding your rights as a research subject, contact the UM Institutional Review Board (IRB) at (406) 243-6672. Please print or save a copy of this page for your records.

- I agree to participate in this research (continue to survey)
- Do not wish to participate in this research

➔ Non-response questions: Q3 and Q17 displayed

- At what site did you receive this survey? (*Intercept or pamphlet links only*)
 - Lochsa Lodge (Lolo Pass, ID)
 - Elk Summit Parking Area, Rd. 111 (Lolo Pass, ID)
 - Elk Meadows Parking Area (Near Lolo, MT)
 - Earl Tennant Parking Area (Lolo Hot Springs Area)
 - East Fork Parking Area (Lolo Hot Springs Area)
 - Fish Creek Parking Area (Lolo Hot Springs Area)
 - Haugan Parking Area (Haugan, MT)
 - Canyon Creek Parking Area (North of Columbia Falls, MT)
 - Desert Mountain Parking Area (Near Martin City, MT)
 - Crane Mountain (Near Bigfork, MT)
 - Porcupine Parking Area (Near Swan Lake, MT)
 - Swift Creek Parking Area (Whitefish, MT)
 - Olney Parking Area (Near Whitefish, MT)
 - Fitzsimmons Trailhead (Near Stryker, MT)

- Taft Parking Area (Taft, MT)
- De Borgia Parking Area (Henderson, MT)
- Martin Creek Trailhead (Near Trout Creek, MT)
- West Side Parking Area (Seeley Lake, MT)
- Seeley Creek Parking Area (Seeley Lake, MT)
- Garnet Range Rd. Parking Area (Near Potomac, MT)
- Birch Creek Recreation Area (Near Eureka, MT)
- Skalkaho Snowpark (Near Hamilton, MT)
- Lost Trail Pass Snowpark Trailhead (Lost Trail, MT)
- Lost Horse Parking Area (Near Como, MT)
- Other site (please specify)

Q#	Variable	Question	Scale	Response Options	Citation
Visitor Characteristics					
1	Time participating	Including this year, how many years have you participated in snowmobiling?	Continuous	Numeric	
2	Activity days	How many days do you go snowmobiling in a typical winter?	Continuous	0 - 365	
3	Skill level	How would you rate your skill level as a snowmobiler?	Categorical (Select 1)	Beginner, Intermediate, Advanced, Expert	

4	Time spent riding	How many hours is an average snowmobile ride for you?	Continuous	0 - 24
5	Overnight Snowmobile Trips	Do you participate in overnight snowmobile trips?	Categorical - Binary	Yes, No
6	Backcountry Trips	Do you participate in <i>backcountry</i> (i.e., winter camping) overnight snowmobile trips?	Categorical - Binary	Yes, No
7	Trip Nights Spent	How many nights do you typically spend away from home for a snowmobiling trip?	Continuous	0 - 365
8	Type of group	What type of group best describes who you typically go snowmobiling with?	Categorical (Select 1)	Self, Significant other, Family, Friends, Family and Friends, Organized Club/Group
9	Group size	How many people are typically in your group when you go snowmobiling?	Continuous	Numeric
10	Designated trail frequency	How frequently do you snowmobile on designated groomed trails/roads?	Categorical	Never, Rarely, Sometimes, Often, Always
11	Off-trail frequency	How frequently do you snowmobile in designated dispersed areas (off-trail)?	Categorical	Never, Rarely, Sometimes, Often, Always

12	Dispersed Winter Activity Participation	What dispersed winter recreation activities do you participate in? (Select all that apply)	Categorical	Snowmobiling, Nordic/X-country skiing, Backcountry skiing, Snowshoeing, Winter hiking, Fat-tire biking, Ice climbing, Dog sledding, Ice fishing, Snow biking (motorized), Other (please specify)
13	Primary Dispersed Winter Activity Participation	What dispersed winter recreation activities do you primarily participate in?	Categorical (Carry forward from Q13)	Snowmobiling, Nordic/X-country skiing, Backcountry skiing, Snowshoeing, Winter hiking, Fat-tire biking, Ice climbing, Dog sledding, Ice fishing, Snow biking (motorized), Other (please specify)

14	Vehicle ownership	Do you own a snowmobile?	Categorical - Binary	Yes, No	
<hr/>					
Conflict Typology					
<hr/>					
15	Observed Behaviors	How often have you observed the following situations/events while snowmobiling	Categorical	Never, 1-2 times, 3-5 times, Almost always	Gibson & Fix, 2014; Vaske et al., 2007
	Noise	Heard other snowmobilers			
	Smelled exhaust	Smelled another snowmobilers exhaust			
	Control	Saw other snowmobilers riding out of control			
	Speed	Saw snowmobilers riding too fast			
	Rude/Discourteous	Saw snowmobilers being rude/discourteous			
	Pass to closely	Saw snowmobilers pass too closely			
	Yield to right of way	Saw snowmobilers not yield to the right of way			

	Disturb wildlife	Saw snowmobilers disturb wildlife			
16	Perceived Problem Behaviors	When recreating, how much of a problem are the following events/situations	(1-4)	Not a problem-extreme problem	Gibson & Fix, 2014; Vaske et al., 2007
	Noise	Hearing other snowmobilers?			
	Smelled exhaust	Smelling another snowmobilers exhaust?			
	Control	Snowmobilers riding out of control?			
	Speed	Snowmobilers going too fast?			
	Rude/Discourteous	Snowmobilers being rude or discourteous?			
	Pass to closely	Snowmobilers passing too closely?			
	Yield to right of way	Snowmobilers not yielding to the right of way?			
	Disturb wildlife	Snowmobilers disturbing wildlife?			
17	Bothered	To what extent do you disagree or agree with the following statements?	Categorical	Strongly disagree, Disagree, Neutral, Agree, Strongly agree	Gibson & Fix, 2014

Other snowmobilers	Other snowmobilers in the area bothers me.	
Hearing others	Hearing other snowmobilers bothers me.	*Removed from analysis
Smelling others	Smelling snowmobilers exhaust bothers me.	*Removed from analysis
Seeing other ride out of control	Seeing other snowmobilers ride out of control bothers me.	*Removed from analysis

Membership

18	Organization membership	Are you a member of a snowmobile organization/group?	Categorical- Binary	Yes, No
19	Organization Name	What snowmobile organization/group are you a member of? (Skip Q19 if answered "no" to Q18, proceed to Q20)	Categorical	Ten Lakes Snowmobile Club, Lincoln County Sno-Kat Club, Seeley Lake Drifters, Troy Snowmobile Club, Cabinet Ridge Riders, Missoula Snowgoers, Flathead Snowmobile

Assoc., Montana
 Nightriders, Bitterroot
 Ridge Runners, Other
 Montana Club or
 Organization (please
 specify), Montana
 Snowmobile Association
 (MSA), Other Club or
 Organization not in
 Montana (please specify)

Perceived Appropriateness

				Backman et al.,
20	Rate the appropriateness of the following behaviors while snowmobiling ...	(1-7)	Very inappropriate (1), very appropriate (7)	2018; TreadLightly! Principles
Travel Responsibly	Traveling only in areas open to snowmobiles.		TreadLightly! Principle #1	
Travel Responsibly	Traveling off trail to experience the natural environment.		TreadLightly! Principle #1	*Reverse coded

Travel Responsibly	Participating in “high-marking” in an avalanche prone area.	Operational	*Reverse Coded
Respect the right of others	Traveling through private property to reach a destination.	TreadLightly! Principle #2	
Respect the right of others	Keeping speeds low around crowds and staging areas.	TreadLightly! Principle #2	
Educate yourself	Contact the land manager for area restrictions, closures and permit requirements.	TreadLightly! Principle #3	
Educate yourself	Wearing an avalanche transceiver, shovel and probe on your body at all times.	TreadLightly! Principle #3	
Avoid sensitive areas	Approaching wildlife for a photo.	TreadLightly! Principle #4	*Reverse coded
Avoid sensitive areas	Avoiding areas of low snow.	TreadLightly! Principle #4	

Do your part Prevent unnecessary noise with a well-maintained vehicle. Tread Lightly Principle #5

Do your part Carry a trash bag and pick up litter left by others. Tread Lightly Principle #5

Demographics

21	Age	What is your age?	Continuous	Numeric
22	Gender	What is your gender?	Categorical	Male, Female, Non-binary, Prefer not to say
23	Education level	What is the highest degree or level of school you have completed?	Categorical	Less than high school, High school graduate, Some college, Vocational/trade school certificate, Associate's Degree, Bachelor's Degree, Master's Degree, Doctorate or Professional Degree

24	Income	What is your income level?	Categorical	Less than \$25,000, \$25,000 to \$49,999, \$50,000 to \$74,999, \$75,000 to \$99,999, \$100,000 to \$200,000, \$200,000 or more
20	Live in US	Do you live in the US? (If "Yes" skip to 22, if "No" skip to 21)	Categorical-Binary	Yes, No
21	Country	What country do you live in?	Open, write-in	Country
22	Zip Code	What is your home zip/postal code?	Continuous	Numeric

o End of Survey:

Your response has been recorded. Thank you for taking the time to help improve the snowmobile winter recreation experience.

Your response is greatly appreciated and will support winter recreation for all Montanans and visitors to this wonderful state!

Appendix D: Demographics of Respondents

Variable	Response Options	Statistic	N=
Age	18-100	Range = 18-76	223
		Mean = 44.07	
		SD = 14.68	
Gender			227
	Male	76.7%	174
	Female	20.3%	46
	Non-binary	0.9%	2
	I identify as:	1.3%	3
	Prefer not to respond	0.9%	2
Education Level			226
	Less than High School	0.9%	2
	High School Graduate	24.3%	55
	Vocational/trade school cert.	8.4%	19
	Some College	13.3%	30

	Associate's Degree	11.9%	27
	Bachelor's Degree	29.2%	66
	Master's Degree	11.1%	25
	Doctorate or Professional Degree	0.9%	2
Income Level			204
Mean = 3.97	Less than \$25,000	4.4%	9
SD = 1.329	\$25,000 to \$49,999	10.8%	22
	\$50,000 to \$74,999	20.1%	41
	\$75,000 to \$99,999	24.0%	49
	\$100,000 to \$200,000	29.9%	61
	\$200,000 or more	10.8%	22
Residency			229
	US	99.6%	228
	Other	0.4%	1
Zip Code			225
	In-State	92.4%	208
	Out-State	7.6%	17
	Most frequent zip	59711	25

Appendix E: Visitor Characteristics of Respondents

Variable	Response Options	Statistic	N=
Years Participating	1 - 100 years		249
		Range = 1 - 60 years	
		Mean = 20.92 years	
		SD = 15.26 years	
		Mode = 20 years	
Days Snowmobiling	1 - 365 days		249
		Range = 2 - 150 days	
		Mean = 21.16	
		SD = 15.24	
		Mode = 20 days	
Skill Level			250
	Beginner	8.0%	20
	Intermediate	38.8%	97
	Advanced	45.6%	114
	Expert	7.6%	19
Avg. Snowmobile Ride	1 - 24 hours		250
		Range = 1 - 12 hours	

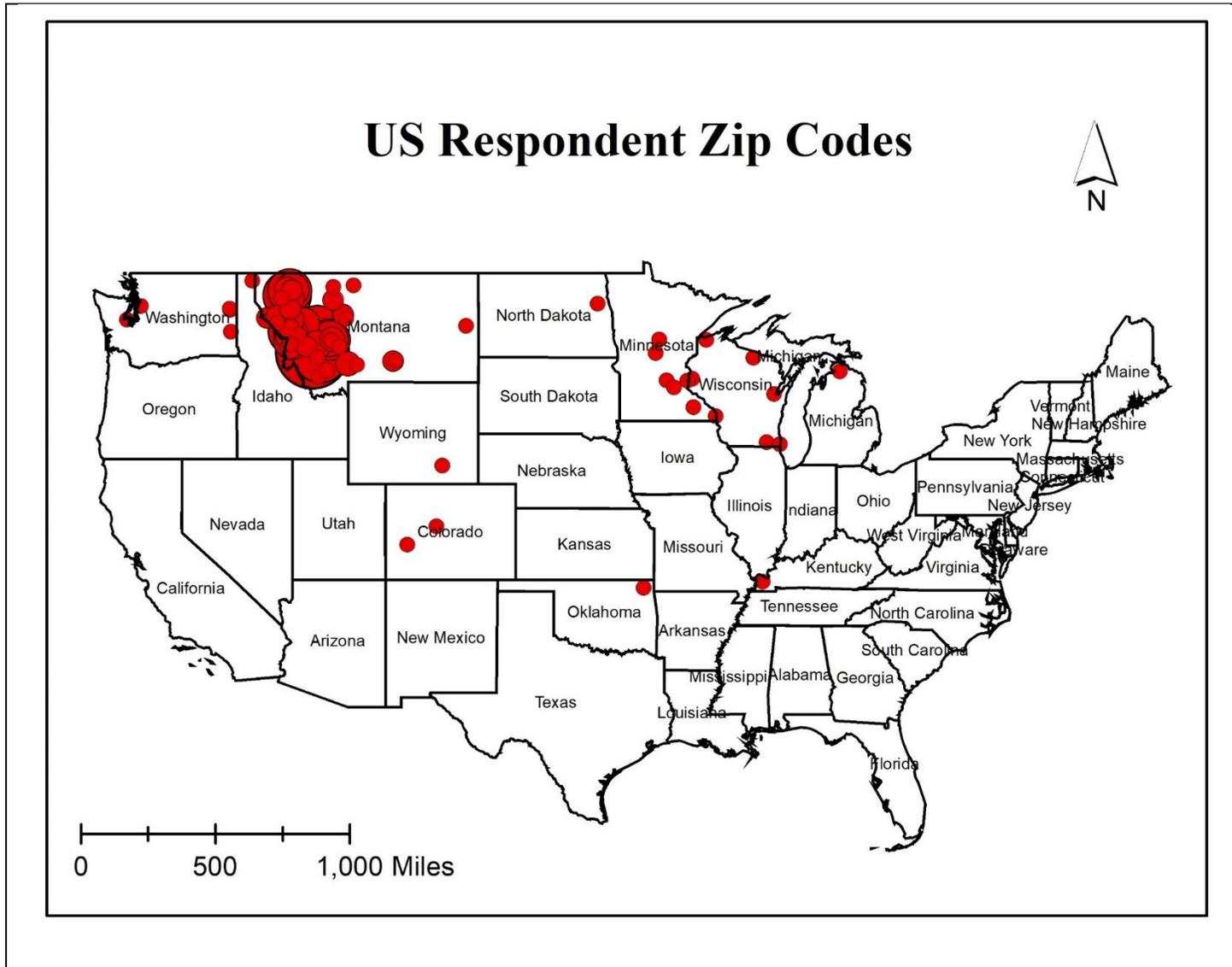
		Mean = 6.1 hours	
		SD = 1.69 hours	
		Mode = 6 hours	
Overnight Snowmobile Trips			250
	Yes	58.4%	146
	No	41.6%	104
Back. Overnight Snow. Trips			146
	Yes	24.7%	36
	No	75.3%	110
Overnight Snow Trip Length	1 - 365 nights		139
		Range = 1 - 45 nights	
		Mean = 4.06 nights	
		SD = 4.56 nights	
		Mode = 2 nights	
Type of Group			249
	Self	0.8%	2
	Significant other	5.6%	14
	Family	6.0%	15
	Friends	28.9%	72

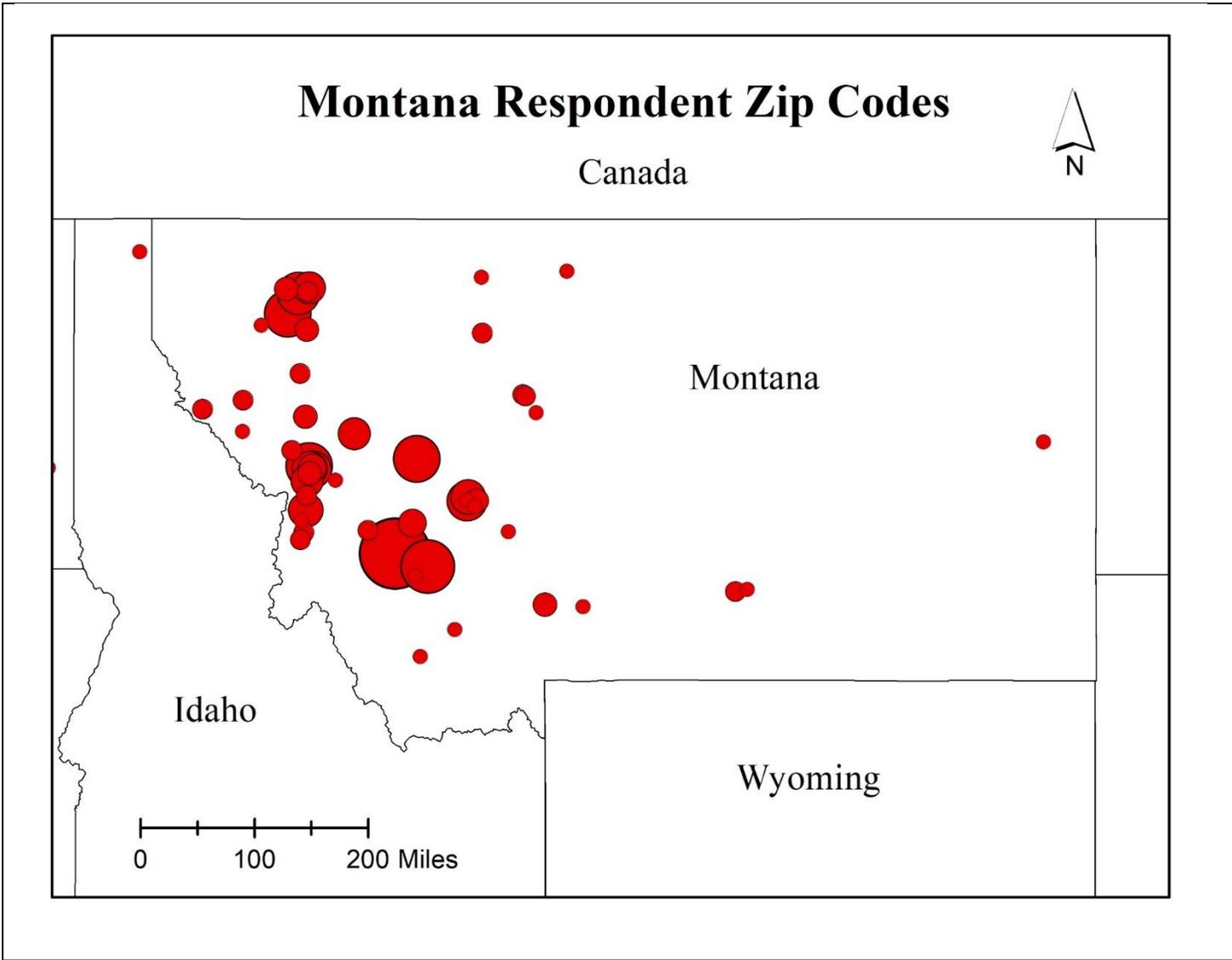
	Family and Friends	55.8%	139
	Organized Club/Group	2.8%	7
Group Size	1 - continuous		246
		Range = 1 - 30 people	
		Mean = 5.02 people	
		SD = 2.66 people	
		Mode = 4 people	25.2%
Groomed Trail Frequency			248
	Never	0.4%	1
	Rarely	10.5%	26
	Sometimes	28.2%	70
	Often	40.3%	100
	Always	20.6%	51
Dispersed Area Frequency			249
	Never	2.0%	5
	Rarely	8.0%	20
	Sometimes	12.9%	32
	Often	50.2%	125
	Always	26.9%	67
Activity Participation			250

	Snowmobiling	100.0%	250
	Nordic/X-Country Skiing	14.4%	36
	Backcountry Skiing	14.8%	37
	Backcountry Snowboarding	7.2%	18
	Snowshoeing	20.8%	52
	Winter hiking	15.2%	38
	Fat-tire Biking	3.2%	8
	Ice climbing	2.0%	5
	Dog sledding	0.8%	2
	Ice fishing	32.0%	80
	Motorized snow-biking	11.6%	29
	Other (SxS, Hunting, Horse Riding, Grooming)	3.6%	9
Primary Winter Recreation Activity			245
	Snowmobiling	86.1%	211
	Nordic/X-Country Skiing	1.2%	3
	Backcountry Skiing	6.5%	16
	Backcountry Snowboarding	0.8%	2

	Snowshoeing	0.4%	1
	Winter hiking	0.0%	0
	Fat-tire Biking	0.0%	0
	Ice climbing	0.0%	0
	Dog sledding	0.0%	0
	Ice fishing	2.0%	5
	Motorized snow-biking	2.4%	6
	Other (Downhill Skiing)	0.4%	1
Snowmobile Ownership			248
	Yes	95.2%	236
	No	4.8%	12

Appendix F: Map of Respondent Zip Codes





Appendix G: Descriptive Statistic Results for Appropriate Recreation Behaviors

Variable (Recreation Behavior)	N=	Range	Minimum	Maximum	Mean	SD
Traveling only in areas open to snowmobiles	228	6	1	7	6.37	1.54
Traveling off trail to experience the natural environment	229	6	1	7	6.33	1.36
*Participating in "high-marking" in an avalanche prone area	228	6	1	7	2.92	2.04
*Traveling through private property to reach a destination	224	6	1	7	1.91	1.64
Keeping speeds low around crowds and staging areas	228	6	1	7	6.71	.986
Contact the land manager for area restrictions, closures and permit requirements	226	6	1	7	6.12	1.51
Wearing an avalanche transceiver, shovel and probe on your body at all times	229	6	1	7	6.55	1.14
*Approaching wildlife for a photo	227	6	1	7	1.76	1.29
Avoiding areas of low snow	229	6	1	7	5.55	1.91
Prevent unnecessary noise with a well-maintained vehicle	228	6	1	7	5.76	1.67
Carry a trash bag and pick up litter left by others	229	6	1	7	6.48	1.23
*Reverse coded						